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THE HOME STUDY OF CORAL REEFS*

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3. *Barrier Reefs and Atolls on Still-standing Islands.*[8] The shore of an oceanic island, newly formed by volcanic eruption, and then suffering no change of level as a result of subsidence or of elevation of the ocean bed from which it was built up, may be colonized by floating coral larvæ, and, as result, a fringing reef will be formed around it. The reef may then grow outward on its own talus, while its inner part is dissolved away, leaving a lagoon; thus the fringing reef will be converted into a barrier reef. In the meantime the central volcanic island will be worn down lower and lower; and eventually, after a long continued enlargement of the reef by outward growth and of the lagoon by solution, the central island may disappear, and the barrier reef will then become an atoll.

This theory, like the preceding one, is based upon the improbable postulate of an unchanging ocean bed and still-standing islands. It then proceeds by easily imagined steps, but its consequences are incompletely stated. It is eminently possible that a reef may grow outward on its own talus; but if so, the entire mass of the reef must have a steep-dipping talus structure, probably disordered by slips and slides, but nowhere showing horizontal stratification. The detailed outline of the outgrowing reef will be more or less affected by winds and currents, as in the case of atolls, above mentioned; but the larger outlines will be chiefly determined by the form of the

* Continued from the August *Bulletin*, pp. 561–577.

[8] Sir J. Murray: On the Structure and Origin of Coral Reefs and Islands, *Proc. Roy. Soc., Edinb.*, Vol. 9, 1880, pp. 505–518.

island that the reef encloses. The submarine part of the reef should rest upon a non-eroded volcanic slope. It is theoretically possible that solution may dissolve away the inner border of a reef, where coral growth is weak or absent, and thus enlarge a lagoon; but it has already been stated that the deposits of the lagoon bottom do not favor the supposition that its entire area results from the removal of pre-existent reef-limestone by dissolving it out.

A central volcanic island may be conceived as standing still while a surrounding reef grows outward; but if so, many members of its flora and fauna must be only accidentally related to those of neighboring islands, as a result of haphazard transportation back and forth in recent as well as in earlier times; they will not show those systematic relationships which are said to exist in certain island groups, and which are only explicable by slow evolutionary variation from common ancient ancestors without modern intermixture: this important principle will be further considered in connection with the sixth theory here listed. Again, islands outside of the coral seas, and hence not protected by reefs, ought to have platforms cut around their shores by the waves, as is more fully considered under the next theory.

Furthermore, if the central island of a reef stands still, any initial embayments of the shore line, due to irregularity of volcanic growth, will soon be filled with gravel, sand and mud; and deltas will be thereafter built forward on the initial reef or in the lagoon at a rate proportional to their drainage area. It is here important to note that the deltas will not be at the head of bays, for bays, apart from those due to initial inequality of volcanic construction or engulfment, do not exist on volcanic islands that have not subsided. The deltas will form salients outside of the simple perimeter of the initial volcanic cone. As they are built farther forward, they will widen laterally, and eventually unite in a confluent alluvial lowland around the island, wider in front of the valleys, narrower in front of the ridges and spurs; and at the same time the central island will be slowly worn down to fainter and fainter relief, and its deltas may ultimately be removed by the lagoon waters, and then an atoll would result; but if all of the many existing atolls have been thus formed, many examples of barrier reefs should be found in which the central islands show subdued forms and low relief in the slowly changing, long lasting, penultimate stages of almost complete degradation; and in the completed atolls, volcanic rocks should be found by boring through a thin cover of calcareous muds in the center of the lagoon.

These consequences are very imperfectly matched by the facts. Tahiti is instanced as possessing an alluvial lowland around the base of its dissected volcanic mass, and thus as confirming this theory. Darwin recognized this many years ago, and interpreted it as indicating a pause in subsidence;[9] but he recognized also that such alluvial lowlands were not of common occurrence around the central islands of barrier reefs, most of which have embayed shore lines; hence, after considering the possibility of outward reef-growth around a still-standing central island, he properly discarded it as of rare occurrence. No good examples of vanishing central islands, worn down to low relief as demanded in the penultimate stage of this theory, are known, although in view of the common occurrence of atolls they should be abundant; hence it is improbable that actual atolls represent the ultimate stage. The borings in the lagoon of Funafuti, to depths of over a hundred feet beneath its floor, did not discover volcanic rock; hence this atoll cannot be built around a worn-down, still-standing volcanic island. In this connection we may quote the opinion of Hedley and Taylor, regarding the Great Barrier Reef, northeast of Australia, to the effect that if the reef had been built outward during a still-stand of the mainland, the mainland border should now be worn down to a peneplain and fronted with deltas; but, as a matter of fact, good-sized hills still enclose the valleys, which mouth in embayments, the outlines of which have as yet hardly been softened by the deposit of sediment along their shores, though there are alluvial flats at the same bayheads.[10]

The structure of uplifted reefs is so imperfectly described—perhaps because the observers of these significant structures had not consciously deduced the contrasted consequences of rival theories—that it cannot be safely used in the present discussion; but as far as I have read, there is no well attested example of an uplifted reef which consists wholly of outward-slanting talus layers. Some uplifted reefs seem to have been built on eroded surfaces, and this implies subsidence before or during the growth of the reef, as will be further considered in a later section.

This theory is therefore, to say the least, not proved to be a counterpart of nature, unless in local, special and exceptional cases. It is ingeniously contrived; but its leading postulate of a still-standing central island is not tested by an examination of the flora

[9] Coral Reefs, p. 128.

[10] Coral Reefs of the Great Barrier, Queensland . . . *Proc. Austr. Assoc. Adv. Sci.*, Vol. XI, pp. 907, 397–413; see pp. 410–411.

and fauna or of the shore lines of the central islands enclosed by barrier reefs; if it were thus tested it would, if we may accept the conclusions of certain zoologists, be in nearly all cases contradicted. One of the essential consequences of the theory—the occurrence of alluvial lowlands around the inner border of the lagoon—is of decidedly exceptional occurrence; another—the rough bottom of the lagoon, as a result of solution—does not correspond to the facts; others, as to internal structure, are not now confirmable, because the corresponding facts are invisible in actual barrier reefs, and imperfectly determined in uplifted reefs. The theory would be improved, if it were amended by replacing the postulate of a still-standing island by a slowly subsiding island, but that would transform it into the theory here numbered 6. Judgment must therefore be pronounced against it, except in special cases where alluvial lowlands occur within the lagoon; and even in these cases, the still-stand thus indicated may be only a pause in a prolonged subsidence.

4. *Veneering Reefs on Sea-cut Platforms.*[11] A still-standing island, attacked by the sea and unprotected by a growing reef, will have a platform cut at a moderate depth all around its border; a reef may then be built on the outer border of the platform, enclosing a lagoon; thus a barrier reef will be formed without subsidence or outward growth. This theory is based on the tacit postulate that corals shall not establish themselves until the platform has gained a considerable width; this appears unreasonable, inasmuch as newly established, discontinuous fringing reefs have been observed on the uncliffed shores of a young, slightly dissected volcanic cone in the island of Mehetia, east of Tahiti.[12] Several essential consequences of this hypothesis, not stated, however, by its advocates, are that the island should rise in steep cliffs from the inner border of the sea-cut platform, as was pointed out by Darwin in 1842; that islands of this form should occur outside of the coral seas, and the older the island, the broader its platform; that, after a barrier reef is established on the outer border of the platform, enclosing a shallow lagoon, a talus should accumulate at the base of the cliffs and deltas should be built forth from valley mouths; and that uplifted reefs of this kind should have small thickness on the outer border of a nearly horizontal bench of volcanic rock which contours around the fading cliffs of the central mass. The floræ and faunæ of neighbor-

[11] Journal of Voyages and Travels. By the Rev. Daniel Tyerman and George Bennet. Deputed from the London Missionary Society to visit their various stations in the South Sea Islands, China, India, etc., between 1821 and 1829. 3 vols. Vol. I, p. 215. Crocker & Brewster Boston, 1832. (This reference is taken from Darwin's "Coral Reefs.")

[12] A. Agassiz, *Mem. Mus. Comp. Zool.*, XXVIII, 1903, p. 140.

ing islands should be accidentally related, as stated under the previous theories; but this requirement is contradicted by the facts, as far as they have been closely studied. Furthermore, no cliffed volcanic islands, surrounded by a shallow submarine platform not yet colonized by corals, and no barrier reefs around a lagoon with a cliffed central island are known in the coral-reef regions: hence this theory has seldom found favor.

The postulate of a still-standing central island has already been shown to be improbable; no independent evidence is presented to show that the postulate is reasonably acceptable in the islands to which the theory has been applied. The action of the sea in cutting a platform around an undefended volcanic island is not to be denied, but when the features appropriate to such action—a central island with a sea-cliffed margin—are looked for, features of quite another kind are found. It is important to recognize that the cliffs, which must necessarily rise from the inner border of a wave-cut platform on a volcanic island that has not suffered subsidence, will not truncate promontories between bays, for, as already stated, bays, apart from those due to the initial inequalities of the volcanic cone, do not occur on volcanic islands that have not subsided. The cliffs at the inner border of a sea-cut platform will usually have a somewhat simpler outline than the initial circle or oval of the volcanic cone; they will be less developed on beds of resistant lavas, and more developed on beds of loose ashes. If the volcano is young and the platform is narrow, the cliffs will be relatively immature, ragged and low, and will be interrupted only by narrow, young gorges; if the volcano is longer extinct and the platform is wide, the cliffs will be high because they will have been cut far back into the conical island; and they will be interrupted by broadly opened valleys, because the time required for cutting a wide platform will be long enough for the mature dissection of the cone. These are systematic relations which deserve conscious consideration in the study of central islands within barrier reefs; they illustrate a modern phase of rational geography, in which the systematic evolution of land forms is fully recognized, just as the biotic relations of neighboring islands, briefly mentioned above and more fully treated under the sixth theory of this list, illustrate a modern phase of rational biology, in which the systematic evolution of organic forms is fully recognized. There was a time, not long ago, when land forms, like organic forms, were thought to be outside of an investigator's responsibility, because they were taken to have been made about as we now see them. The general adoption of an evolutionary philos-

ophy has changed all that, and land forms are now seen to be the result of inorganic evolution, and hence to be fit subjects for intelligent study, just as plant and animal forms are seen to be the result of organic evolution.

The tacit postulate of the delayed colonization of a volcanic island by corals is inherently improbable, and no evidence is adduced to show that it may be accepted. The small thickness of the veneering reefs on the outer border of a nearly level sea-cut platform is not proved by borings, or by the features of uplifted reefs. The theory can have only a very restricted application, if it holds true at all. Adverse judgment need not be suspended.

5. *Veneering Atolls on Sea-cut Platforms.*[13] It is here assumed that a still-standing island is completely truncated and that a reef then built around the border of the truncating platform forms an atoll. As in the preceding theory, a tacit postulate is here made that corals shall not establish themselves on the border of the platform until the sea has completed its work of truncation, and so long a postponement of their arrival is certainly unreasonable. If the numerous atolls of the Pacific had been formed in this way, borings should show volcanic rocks at small depth beneath the whole of the lagoon; some nearly and some completely truncated volcanic islands should occur in the temperate oceans, outside of the coral zone; and, above all, some examples of penultimate truncation should occur in the coral seas, showing cliffed island remnants rising above a broad and shallow platform without reefs. None of these consequences are, as far as I have been able to learn, confirmed by the facts. It is true that the charts of our Hydrographic Office show some singular, residual, spine-like rocks, much higher than they are broad, rising from the sea south of Japan; one, known as Lot's Wife (29°45′ N., 140°20′ E.), is 466 feet high, with no bottom at twenty fathoms close around it; another, Smith Island (31°30′ N., 140°0′ E.), is 421 feet high, with depths over 100 and 200 fathoms near by it. Both these rocks have overhanging profiles on one side; they seem to resemble the famous volcanic spine of Montagne Pelée, and may have lost the weaker, fragmental material with which their base was originally enclosed; but they do not appear to correspond to a late stage in the truncation of a large island, for they are not surrounded by a shallow platform. The flat platforms, in the Pacific, without coral reefs rising to the surface, which suggested this theory, might be as well explained as former atolls, too rapidly depressed to be built up, as Darwin long ago suggested for the Chagos Bank. This theory

[13] Rear Admiral W. J. L. Wharton: . . . *Nature*, Vol. LV, 1897, pp. 390-393.

has therefore found little favor. Comments similar to those made on the preceding theory apply here with equal force.

6. *Reefs Built on Subsiding Islands.*[14] This theory postulates in its simplest form that the islands "on which the reefs first became attached, slowly and successively sank beneath the sea, whilst the reefs continued to grow upward"; thus a fringing reef will be transformed into a barrier reef enclosing a lagoon around a diminished island, and into an atoll, after the island disappears.

Let it be here noted that the term coral reef, as used by Darwin and indeed by most other writers, has two meanings:—one is the visible belt of corals with a small thickness of coral limestone beneath; the other is the whole mass which, it is inferred, is added to a volcanic island to produce a fringing or barrier reef, and which therefore includes the interior lagoon deposits and the exterior talus deposits, along with the coral limestone that has been formed, according to the present theory, during the upgrowth of the reef proper. It is important to recognize this double meaning, because some recent studies suggest the separation of the reef in its smaller meaning from the larger understructure, and propose for the whole of the latter, the greater part of which is presumably not composed of coral rock but of lagoon and talus deposits, the name platform. It is, however, not yet shown that coral rock does not extend downward about as deep as the outer part of the platform, or that the reef and the platform have not been formed together, essentially in the manner that Darwin supposed. It should not be overlooked that Darwin clearly recognized the strong difference between the calcareous muds of the lagoons and the coral rock of the reef proper; he recognized also the abundant growth of nullipores in association with reef-making corals, though he did not give to these calcareous algæ the importance that has been ascribed to them in recent years; he naturally knew nothing of the recently discovered action of bacteria in forming the oölitic muds of the lagoon, and he did not discover that the platform in some cases extends along a continental margin farther into temperate latitudes than the limits of the coral zone; for example, southward along the eastern coast of Australia, as was shown by Andrews twelve years ago, and northward along the eastern coast of Florida, as has recently been pointed out by Vaughan. But, let it be repeated, there is at present no sufficient reason for rejecting the idea that, in waters warm enough for the growth of reef-building corals, the reef and the platform have had essentially their present relation during the entire period of forma-

[14] C. Darwin: The Structure and Distribution of Coral Reefs. London, 1842; 2d edition, 1874.

tion of a barrier reef in the larger sense of that term. It is therefore, in my judgment, going too far to say that "an inspection of the admiralty charts for the eastern coast of Australia shows conclusively.....that corals have established themselves on this platform where the conditions favorable for their life were realized," and that "a study of the charts of barrier reef islands... shows that the platforms are independent of the presence of the reefs....for here the reefs are also superimposed on platforms antedating their presence."[15] The occurrence of many uplifted reefs at successive altitudes on certain islands, as in the Philippines, shows that reef-building corals have been, for a long time, growing in the coral seas; hence, if the platform of a barrier reef were formed during slow subsidence, as is eminently probable in the Australian reef, at least, a coral reef may have occupied its margin during the whole period of its growth, just as it does now; and in such case the reef would not be superposed on the finished platform, but would have grown up with it.

Before going farther it should be pointed out that Darwin's postulate of general subsidence over large areas may have to be modified in view of facts discovered since his time; but it should, at the same time, be noted that such modification of his theory by no means invalidates its essential principle, although it makes the action of subsidence in the Pacific Ocean less simple than he regards it in his first paper on this subject.[16] Certain objections that have been urged against Darwin's main postulate are nevertheless irrelevant; for example, it has been urged that, because elevation is proved by high-standing reefs in certain regions, therefore subsidence has not taken place in certain other regions; it would be as fair to argue that, as subsidence is proved by the drowned valleys of certain oceanic islands, therefore high-standing reefs have not been elevated, or to argue that, because high-standing reefs are usually of moderate thickness, therefore barrier reefs cannot generally be of great thickness. Indeed, certain high-standing reefs are found to contour around a previously eroded land surface, instead of resting on a non-eroded surface as is required by the third theory here discussed, and they thus prove that, before elevation, subsidence took place to at least as great a measure as the difference of altitude of the lowest and the highest reefs; and in such a case it must remain an open question, until new details are observed, whether

[15] T. W. Vaughan, *Journ. Wash. Acad. Sci.*, Vol. IV, 1914, pp. 32, 33.

[16] C. Darwin: On certain areas of elevation and subsidence in the Pacific and Indian Oceans, as deduced from the study of coral formations, *Proc. Geol. Soc., London*, Vol. II, 1837, pp. 552–554.

the reefs were formed from lowest to highest during pauses in the subsidence by which the eroded land surface was submerged, or from highest to lowest during pauses in the elevation by which the reefs were uplifted; or some during subsidence and others during elevation. It may not always be easy to recognize whether the contact of the reef with the preexistent land surface is unconformable or not; it must be still more difficult to determine, in cases where uncomformable contacts are found, whether a given reef was formed during subsidence or elevation. Surely not until the nature of the contact of an elevated reef with its foundation has been determined, is it permissible to infer that it testifies only to elevation, and not to subsidence as well.

Another invalid objection that has been urged against the theory of subsidence is that, although a movement of depression may occur in ocean basins on either side of or between groups of volcanic islands, such movement should not be expected on the very site of such islands; but this implies a much fuller knowledge of the relation between vulcanism and diastrophism than we now possess. Subsidence, even of groups of volcanic islands, is, in view of all that is known of the history of oceanic islands, like elevation, a more likely condition than a still-stand.

Besides the consequences that are involved in the statement of his theory of subsidence, Darwin deduced certain others, especially regarding the submarine structure of the total mass: he pointed out that the reef proper "would consist of massive species [of coral] in a vertical position, with their interstices filled up with detritus"; that in the lagoon area "a very large proportion of the rock, and, in some cases nearly all of it, would be formed of sedimentary matter, being in an excessively fine or moderately coarse state"; that "the stratification, taken as a whole, would be horizontal"—the outward-sloping layers of an exterior talus do not seem to have been given special attention—and that in an uplifted reef the horizontal lagoon strata "would more often be preserved to future ages, than the exterior solid reef composed of massive corals in an upright position." These consequences were announced only in a foot note at the end of the fifth chapter of "Coral Reefs," probably because the facts with which they should be confronted were, for the most part, inaccessible; but the contrast here indicated between the mainly horizontal structure of reefs formed during subsidence and the mainly inclined structure of reefs formed by outward growth on their own talus is evidently of critical importance in the study of uplifted reefs. Another consequence of subsidence is that

the reef-mass should be built unconformably upon a surface of subaërial erosion and not upon one of submarine deposition, as has been alluded to above. Unfortunately, so little is now known of the structure of uplifted reefs that they cannot be safely used at present as indicating the origin of reefs that are not uplifted. It would, however, surely seem that the horizontal attitude of the lagoon strata, the occurrence of interbedded sands and gravels near the central island, and the form of the island surface beneath the reef-mass must be critically significant of the conditions under which an uplifted reef was formed. In the case of atolls, borings might detect cross-bedded beach or dune stratification, and an alternation of calcareous layers with guano deposits.

It should be noted that Darwin carefully guarded himself against an undue preference for his own theory by an impartial examination of many others, including those here numbered 1, 3 (omitting solution of the lagoon), 4 and 5, all of which he rejected on good grounds, although recognizing the process of moderate outward growth on a still-standing island as applicable to the island of Tahiti, and, in that case, substituting for the postulate of uniform subsidence the more natural one of subsidence alternating with intervals of rest (Coral Reefs, pp. 128, 130). His readiness to revise his theory is shown in the second edition of his book (1874), in which, as a result of Semper's observations on the Pelew Islands, alternations of elevation and subsidence were recognized as reasonable and possible, if elevated reefs and barrier reefs occur in the same region.

Indeed, after a careful review of many essays on the problem of coral reefs, Darwin's discussion of it in his little book of 1842—to the preparation of which he devoted twenty months of hard work—seems to me more broad-minded and more critical than any other. The great naturalist clearly recognized the desirability of "searching for other evidence of the movements" postulated in his theory, but he adds that "from the nature of things, it is scarcely possible to detect any direct proof of subsidence, although some appearances are strongly in favor of it" (Coral Reefs, p. 147).

There are, however, certain additional and important consequences of the theory of subsidence which were not deduced by its author. One is that subsidence must separate an originally single large island of irregular mountainous form into a group of smaller islands, on which certain members of the fauna and flora—namely, those which cannot migrate and cannot be accidentally transported by wind or water—should show the peculiar resemblances and differ-

ences appropriate to a gradual and long continued evolutionary change from common ancestral forms on an ancient continuous habitat to a modern discontinuous habitat. It may at first thought seem strange that, of all observers, Darwin should have overlooked so significant a matter as this; but it must be remembered that, while he was studying coral reefs, he was not a Darwinian but a special creationist, for when he visited Valparaiso during the voyage of the *Beagle* eighty years ago, he wrote: "I have taken several walks in the country . . . there are very few quadrupeds and birds are not plentiful . . . . I have already found beds of recent shells, yet retaining their colors, at an elevation of 1,300 feet, and beneath this level the country is strewed with them. It seems not a very improbable conjecture that the want of animals may be owing to none having been created since this country was raised from the sea." Under the influence of that ancient biological philosophy, the relationships of the fauna and flora on neighboring islands would have no bearing on the origin of the associated barrier reefs; but under an evolutionary philosophy, it is just as essential that certain plants and animals on islands, surrounded by barrier reefs formed during subsidence, should possess peculiar relationships due to descent from common ancestral forms, as that the shore lines of the islands should, as Dana pointed out, be embayed by the drowning of their valleys.

This line of biological evidence, already briefly referred to, is not so well appreciated by geographers and geologists as by the circle of biologists who have elaborated it. Indeed, the conclusion to which the evidence leads is objected to by some students of earth structure, who, having reached from geological considerations the conviction that continental masses and ocean basins are long-lasting, almost permanent terrestrial features, are therefore disinclined to accept the possibility that a former large land area has sunk to great oceanic depths, particularly if the evidence for so great a change is based only on the distribution of small animals. As against this disinclination it must be recognized that the theory of the permanence of continental masses and ocean basins is based as well on our unavoidable ignorance of crustal structures over the three oceanic quarters of the earth's surface, as on our growing but not yet full-grown knowledge of the remaining continental quarter; it may be further said that the disappearance of various full-fledged mountain structures in the sea, as northeast of Newfoundland, southwest of Ireland, or west of Brittany, and the lateral truncation of large geosynclines by the present continental margin, as in southeastern

Africa, strongly suggest that parts of former continents are now deeply submerged; and finally it should be urged that the detailed biological evidence in favor of extensive submergence is fully as worthy of serious consideration as the general geological evidence against it. The character of the biological evidence is, in essence, as follows:

Imagine several neighboring islands, each of which possesses certain similar yet distinct forms of plants or animals. That these forms were so created, each on its own island, no longer finds a place in biological speculation; for whether the processes of evolution are understood or not, it is agreed on all sides that similar plants or animals are the descendants of common ancestral forms: hence some rational method of accounting for the present distribution of the related forms must be looked for. There are two chief methods: one postulates a still-stand of the islands and some relatively accidental means of transportation, as by tree rafts or storm winds, by which individuals of an ancestral form were carried to the several islands long enough ago for the observed specific differences to have been since then evolved. Two difficulties stand in the way of this method: the first is that no available means of accidental transportation for certain plants or animals across an open water passage can be reasonably imagined, because they are too delicate to survive the exposure to which they would thus be subjected; the second is that, if accidental transportation were formerly available, it ought to operate in modern times as well, and thus produce on each member of an island group, an arbitrarily mixed flora and fauna, including species of recent introduction, that are identical with forms of neighboring islands and species of much earlier introduction that are like but not identical with forms on neighboring islands; for forms of recent transportation from one island to another would necessarily be alike, while those of ancient transportation would now have become unlike. Hence, on islands where such mixtures of species do not occur, this method of distribution must be rejected.

The other method of distribution postulates, first, a former land connection between the now separated islands, and the occurrence of the ancestral species all over this continuous habitat; then a disruption of the land connection in any manner, as by folding, faulting or subsiding, so that several groups of the ancestral species are isolated; thereafter each group varies in its own fashion, and thus the modern differences of the related species are evolved. A standard example of this kind is that of the cassowaries on the

islands north of Australia, described by Beddard in his "Zoogeography."

It is not here possible to mention additional examples of plants and animals on the central islands of neighboring barrier reefs, which indicate the disruption of a former continuous land area by subsidence and which thus give independent confirmation of Darwin's theory explanation of the encircling reefs; but it may be noted that the biologists who have looked most closely into this problem, on the basis of carefully collected specimens, are convinced that isolation by subsidence is its only solution. It may, however, be suggested that the critical point in this argument is the determination of "identical" and of "related but not identical" forms in species not subject to accidental transportation. It would therefore be fair to demand that identity and resemblance should be so sharply differentiated that, if a large collection of forms in groups of a dozen from each locality, regarded as "identical" and as "related but not identical" by their collector, were mixed (each group of a dozen being kept together) without labels, they could be classified by another biologist in essentially the same species that had been previously established with the aid of the collector's labels; for if the classification depends on a knowledge of the locality, as well as on a study of the specimens, non-zoological students will hesitate to accept conclusions based on species thus made.

The most manifest consequence of the theory of subsidence that was overlooked by its inventor has already been alluded to: it is that, as an island subsides, it must not only diminish in size, but it must also acquire a more or less embayed shore line as a result of the advance of arms of the sea into its previously eroded valleys. That so evident and inevitable a consequence of subsidence should have been overlooked is singular enough, and all the more so since Darwin had recognized the occurrence of long bays entering the central islands of barrier reefs; he probably attributed them to marine erosion, after the fashion of his time. His omission was remedied by Dana,[17] who, imperfectly anticipated by De la Beche, first recognized and explicitly stated the important principle that the partial submergence of a dissected land surface must produce coastal embayments. He rightly used this principle in giving independent confirmation to Darwin's theory. It is interesting to note

[17] J. D. Dana: Corals and Coral Islands. 1st ed., 1872; 2nd ed., New York, 1879. The results of Dana's observations, made on Wilkes' Exploring Expedition (1838-1842), were previously published in his Report on Zoöphytes (1846), treating at length of coral reefs and coral animals, and in a chapter on Coral Reefs and Islands (1849) forming a part of his Geological Report in the Report of the Wilkes Expedition.

that Darwin came very near discovering the principle himself; for while he was in Chile he made an excursion from Valparaiso to the base of the Andes, when he noted that Chile "is traversed by several lines of high hills parallel to the great range . . . At the foot of the Andes there is a succession of level basins . . . These basins or plains, together with the flat valleys which connect them with the coast, are the bottoms of ancient inlets and great bays, such as, in the present, intersect every part of Tierra del Fuego and the west coast of Patagonia, etc. Chile, at one time, must have, in the configuration of its land and water, exactly resembled these latter countries. This resemblance was occasionally seen with great force, when a fog bank extended over the whole of the lower parts; the white vapor, curling into all the ravines, beautifully represented the little coves and bays. Here and there a solitary hillock peeped up through the mist and showed that it had formerly stood as an islet."

How curious that a mind as alert as Darwin's did not make the easy step from the floating fog to a rising sea! More curious still that he did not, fifteen years afterwards, notice Dana's explicit explanation of the origin of embayments by subsidence, and seize upon the confirmation thus given to his own theory; but singularly enough no use is made of Dana's principle in the second edition of Darwin's "Coral Reefs" (1874), although Dana is repeatedly quoted there on other topics. The reason for this omission is probably to be found in Darwin's absorption at that time in the discussion of the origin of species; or perhaps in the inattention of one geologist to the writings of another, regarding which Darwin wrote in 1844 or 1845 in a letter to a friend: "As for your pretending that you will read anything so dull as my pure geological descriptions, lay not such a flattering unction on my soul, for it is incredible. I have long discovered that geologists never read each other's works, and that the only object in writing a book is a proof of earnestness, and that you do not form your opinions without undergoing labor of some kind. Geology is at present very oral, and what I here say is to a great extent true." (Life and Letters, Vol. I, pp. 334, 335; Amer. edit., Vol. I, p. 303.)

(*To be concluded*)

A COLLUVIAL SOIL AND ITS PEOPLE

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It is a matter of common observation that, in most regions of mature topography, the majority of the houses are situated in the valleys rather than on the steep-sloped ridges. Here water is usually easily obtained, the easier grades invite the main roads and, finally, the fertile soils are to be found in the valleys or "bottoms."

But the bottom soils in a rugged region should not be confused with those soils of the same name on a flood plain which are so common in the flat-floored valleys characteristic of middle and late maturity. The latter soils are distinctively alluvial, while the former are colluvial soils and are due to soil creep rather than stream deposition. However, it should not be forgotten that, while soil creep is most pronounced in rugged regions, the process is well-nigh universal, for, wherever there are slopes, steep or gentle, there must be a gentle movement down slope; "a movement," says Professor Davis, "of land waste so slow that it is not generally noticed ...a slow wasting and creeping of the waste down the land slopes, not bodily or hastily but grain by grain, inch by inch..... With countless minute changes every particle is led, slowly but surely, from higher to lower ground."

Where slopes and other conditions are favorable, the movement locally becomes a landslide, an unpleasantly familiar feature in some mountainous regions and also in the sub-polar regions, where Hobbs and Andersson have described the "stone rivers" which, impelled by frequent freezing and thawing, move down valleys. But, in most cases, the phenomena of soil creep is overlooked and it is only in regions of steep slopes that its results become economically important.

The area on which this paper is based is Miller County, Missouri, one of the Ozark counties. The Missouri Ozarks, as a whole, consist of a limestone plateau, once well worn down almost to a plain (peneplain) and later elevated so that the streams have eroded wide valleys which are separated by narrow divides, a region so hilly that the usual term, "Ozark Mountains," is not inapplicable. Near the main streams, erosion has indeed produced a topography that consists entirely of slopes except for some narrow strips of flood plain, a belt known locally as the "river brakes"; while, further

back from the zones of active erosion, the old level surface of the old plain extends as "prairie" until the next important stream has produced a belt of "river brakes."

Like most limestone soils, these Ozark soils are usually heavy, fine-grained silts and clays, but, since the limestone is flinty, the slowly decaying flints are left scattered through the soil. The soils belong to the Clarksville series which overlie much of the Ozarks and also considerable portions of the Allegheny Plateau.

These soils when soaked with water tend to creep down slope somewhat like an overloaded sheet of water, but, of course, very much more slowly. When the soils on a slope are frozen, the solidifying water in the soil spaces expands and slightly moves the grains and, again, when thawing occurs, the grains sink back, not vertically, but diagonally down slope. Again, the surface run-off carries fine particles down the slopes. Thus, as a net result of these factors, the finer silts and clays move more rapidly than the cherts, so that the latter are relatively left behind in the down-slope journey. The principal variant in these soils is that of slope, so that the soil varies mainly with the steepness of the slopes; on the level prairie are the silt loams and clay loams which extend down the gentle slopes; on the steep slopes are the stony loams which grade into the colluvial soils near the slope bases.

Thus the hillsides are stony because of the faster movement of the finer soils and are almost invariably covered with a veneer of stony loam. The finer silts move down slope until, near the base of the slope, they accumulate and here lessen the steepness and so facilitate further deposition. As a result a "shoulder" of fine detritus, with its outline often convex to the sky, is formed near the foot of the slope.

This is the colluvial soil strip which is so important in the mountain valleys. The torrential valley stream usually has deposited a narrow belt of stony waste in the colluvial strip, waste that has little agricultural value. The colluvial soil is best described as silty, or technically, it varies from a clay loam to a silt loam. It is generally more sandy than the somewhat stiff upland soil because of the particles of decomposed chert that have moved down slope. The diagram (Fig. 1) shows the general relations of these soils.

Such a colluvial soil is light enough for good tilth and sufficiently porous for good drainage in rainy seasons. It is usually well supplied with moisture both from the seepage water in the valley and from the capillary water which rises from the subsoil to the root zone.

The inhabitants fully realize the importance of these narrow soil belts and generally they are in a high state of cultivation. Farms are large, but a farmer's acreage wealth is estimated more in proportion to the "bottom lands" he owns than to his total acreage. A large acreage of hillside stony loam, which is mostly used for pasture, is balanced by a much smaller acreage of "bottom land" which is expected to furnish the hay, corn, wheat and truck. In laying out the roads that run through the valleys as little colluvial soil as possible has been included. The roads run on the stony loams less than a rod from the smooth colluvial soils and the traveler, jolting along a stony road, looks longingly at the smooth fields but a short distance away. Corn, wheat and alfalfa are the favorite crops and the yields are ordinarily large.

There is the usual response of the people in the "river brakes" to their rather unfavorable environment. Communications are

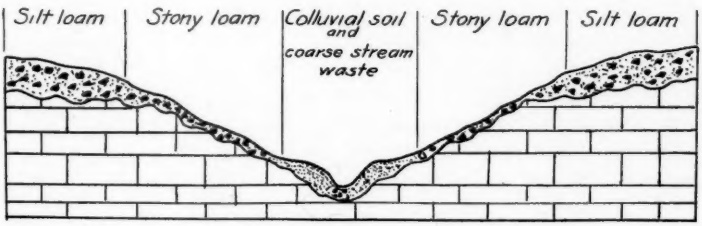


FIG. 1—Diagram showing showing the general relations of the colluvial soils. The vertical scale is much exaggerated.

often difficult and crop yields are not large. Their modes of life and of work are largely those of several generations ago. Local idioms, so numerous as almost to constitute a dialect, are still heard but are rapidly becoming obsolete. The daily paper and the schools have brought culture to many homes, as the people are, for the most part, eager for education. The region was largely settled from the Cumberland Plateau of Tennessee and Kentucky, the close resemblance to which in topography, soils and climate was undoubtedly a factor in attracting immigrants to the Ozarks.

A prophecy of a widespread future response to soil creep was seen on the farm of a German who probably brought from oversea his thrifty management of hillside soils. He has built across his stony, hillside pasture a rough retaining wall and behind this wall the soil creep is building a narrow terrace of very fertile soil. Such an example is most interesting as indicating a utilization of

soil creep when population shall have become denser and agriculture very intensive. Then, it is safe to predict, the stony slopes of many of the limestone hills will show a succession of terraces from base to summit; but such intensive methods are several generations in the future.

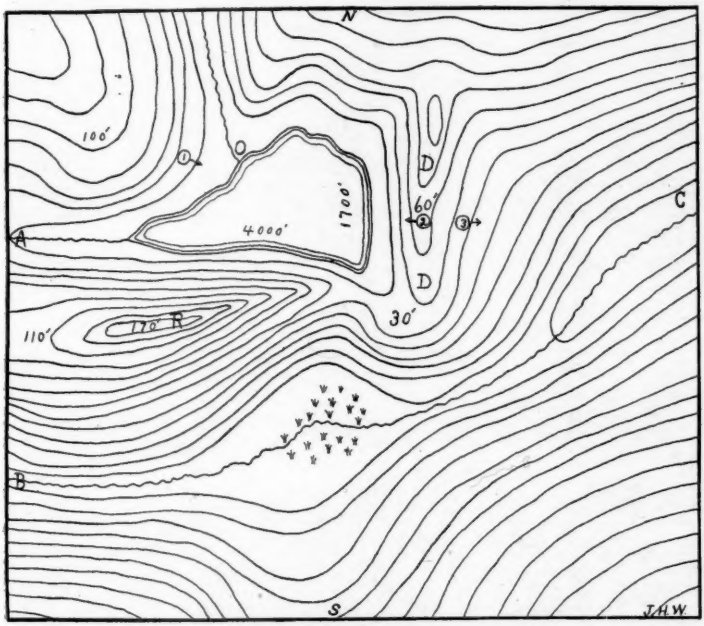
While not strictly pertinent to the topic of this paper, it may perhaps be worth while to allude to a politico-economic difference which often crops out between the prairie dwellers and the residents of the "brakes," the "hill billies," as they are often called. The latter very naturally oppose any increase in the county taxes, for their income is, at best, scanty. In the county under observation the opposition of the "hill billies" had repeatedly defeated a proposition to build a new court house. The authorities from the prairie districts found that, while they could not construct a new court house without a favorable vote of the people, they were allowed by law to make repairs practically without limit. So the old court house was "repaired" by practically building a new structure around the old one.

Summarizing, we have in the area described a maturely dissected limestone plateau where soil creep is necessarily important. The colluvial soil accumulates in a narrow belt near the foot of slopes and is extremely important both because of its fertility and because of the scarcity of arable lands.

A GLACIALLY FORMED LAKE IN SUSQUEHANNA COUNTY, PENNSYLVANIA

By J. HOWARD WILSON, Ph.D.

An interesting case, in a small way, of the changing of preglacial drainage and the formation of a small lake by the deposit of glacial material across an older valley is found at Quaker Lake in Susquehanna County, Pa. It is one of a number of small lakes or ponds in that region and lies close to the northern boundary of the county less than nine miles as the crow flies from Binghamton, N. Y.



Sketch map of Quaker Lake in Susquehanna County, Pa. Approximate scale, 1:35,000. Contour interval, 20 ft. The letters are explained in the text; the numerals in circles with arrows represent the viewpoint and direction in which the three photographs were taken, the numbers corresponding to those of the figures. The map is not claimed to be accurate, but it shows the phenomena described. Some of the distances were roughly measured by pacing. The elevations were estimated or made by aneroid.

At this point, in preglacial times, two small valleys (A and B; *cf.* map), separated by a ridge of Upper Devonian shale and sandstone (R), united to form a fairly deep valley (C) which descended in a

generally easterly direction until Snake Creek was reached, the latter proceeding in a northeasterly direction and emptying into the Susquehanna River some ten miles above Binghamton. The two small valleys or forks have an east-and-west direction, *i. e.* at right angles to the general movement of the ice.

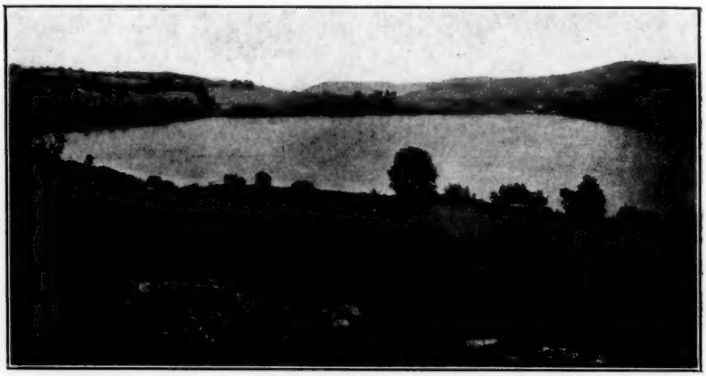


FIG. 1.

FIG. 2.

The lake was formed in the northern fork (A) by the building out, from the northern side of the main valley at point of forking, of a till-like deposit (D), with gravelly surface, which, with descending slope, crossed the valley at the end of the dividing ridge which it closely abutted, completely closing the northern fork and

somewhat impinging on the southern one. This caused a lake to be formed in the northern fork and a marsh which was perhaps originally a shallow lake in the southern fork. The lake is about two-thirds of a mile long and one-half mile wide, and depths obtained from persons residing in the vicinity seem to agree with the slope indicated by the elevation of the valley above the lake (A) and that below the glacial dam (C). The glacial dam, as shown in Fig. 1 and seen from that point, is so plain and the older valley side from which it springs so distinct from it, that it appears almost artificial except for its size and diminishing height. Even at its southern portion, where it abuts against the end of the ridge (R), separating the two forks and thus forming the lake, it is still some thirty feet above the lake level, so that the lake, before overflowing here, found

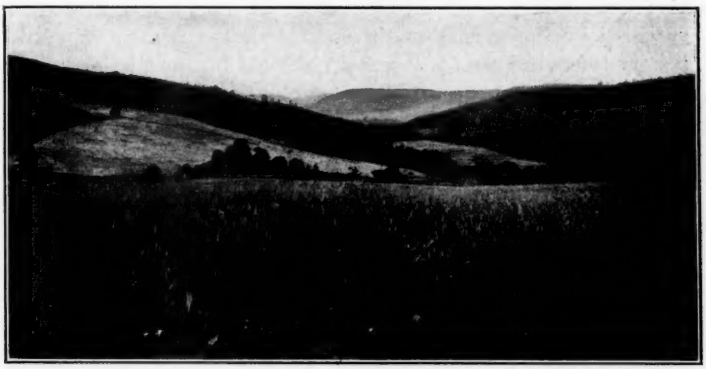


FIG. 3.

an outlet (O) on the northern rim of its basin. In Fig. 1 the outlet is in the hollow on the nearer shore to the left. The drainage of the fork thus, instead of flowing easterly into the main valley and then to Snake Creek, as in preglacial times, now flows north into an entirely different valley.

Fig. 2 taken from the glacial dam, looks up the lake to its narrow and shallow end and shows the effect of the impounding of the waters of a normally formed preglacial valley by the glacial dam. The outlet is here shown at the further shore to the extreme right.

Fig. 3 is taken from the dam in an opposite direction from Fig. 2 and shows well the lower and deeper part of the valley below the dam.

RELATIONS OF ABORIGINAL CULTURE AND ENVIRONMENT IN THE LESSER ANTILLES

By J. WALTER FEWKES

In late years the geologist, climatologist, and oceanographer have largely increased our knowledge of the Lesser Antilles, and naturalists, especially students of fauna and flora, have made important contributions to what was known of the distribution there of animals and plants. The ethnologist and archeologist are now able to give a clearer picture than ever before of aboriginal culture history in the Antilles in pre-Columbian times.[1] In this wealth of material gathered by the specialists the student of the relation of culture history to environment will find a rich field for his studies.

That large part of modern geography dealing with the relation of the earth and man has hardly considered this material, possibly on account of its extent, or the probability that any generalization on what is now known would be premature, so rapidly are new facts accumulating in this field.

In the following pages the author has ventured to consider one aspect of the relation of Antillean culture history to environment, and has limited himself to the aborigines, or so-called pre-Columbian inhabitants, and those features of the physical surroundings that have directly affected them.

Among the influences that have powerfully affected man in the West Indies are geological features, climate, ocean currents and winds, fauna, and flora. Among geological influences may be mentioned contour and relief, extent of coast lines, stability and distribution of land that can be cultivated, and different kinds of soils or rocks. Climate has affected agriculture more than any other physical environmental condition by determining the animals and plants available for food. Currents and winds are powerful agents in distributing organic life and determining the direction of human migrations on the ocean.

Physical Features. The Lesser Antilles, with the exception of Trinidad and Barbados, resemble a chain of volcanoes, or their

[1] The author will later publish an elaborate account of Antillean prehistoric culture based on the magnificent collection of West Indian Antiquities owned by George G. Heye, Esq., of New York.

summits, projecting out of the ocean. Some of these islands rise abruptly from the sea, while others have fringing coastal plains. Volcanoes are, from time to time, active, and igneous rocks predominate. The coast lines are continually changing and relief forms are not constant.

Fertile plains suitable for agriculture exist in many islands, and the shores of drowned river valleys present easy landing places for canoes or small craft, while submerged craters afford landlocked anchorage for larger vessels. Several of the islands are destitute of fresh water, while others have copious streams. In Dominica, the natives say, there are "as many rivers as there are days in the year," but the tufaceous rocks in other islands drink up the rain water before it forms a stream or gets to the sea. In islands having calcareous formations, evidences of former extension of the coast into the sea or elevations of the coast, due to volcanic or other agencies, are shown by the existence of living and semi-fossil genera of shells, echinoderms and corals high above the sea level. Changes in coast lines are common; and in the volcanic islands are abundant lava flows, one superimposed on the other, enabling the observer to measure the extent of the phenomena. The hard volcanic rocks supply material for stone implements; good clay on several islands invites the potter to her work. Sea shells, like *strombi*, have replaced stone for implements in islands like Barbados where there is no rock suitable for stone implements. The igneous boulders, being hard enough to resist rapid aërial or aqueous erosion, have preserved pictures cut upon them by the aborigines, but many of the rock cuttings were so shallow that they are either almost completely obliterated or barely legible.[2]

The longer axes of several of these islands extend approximately north and south, and, as they lie in the tropics where the trade-winds are constantly blowing from the northeast, their eastern side, or as it is called, the windward side, is almost constantly beaten by a heavy sea; on that side also the coast is much more eroded than on the western. On the latter side, however, the winds and waves not being so high, sandy beaches are more common and landing in small crafts is less difficult. The prevailing winds thus brought it about that the best sites for aboriginal settlements were on the lee sides of the islands, where the archeologist finds village sites, or middens, most abundant.

[2] Locally the boulders on which these pictographs occur are called "jumbies" or "altar" stones, the latter term implying a belief in their former use in sacrifices. The West Indian pictographs resemble those of Porto Rico on the one hand, and of British Guiana, on the other, and generally occur near the shore or on the banks of streams, convenient to landing places.

Natural caves occur in many of the islands, more especially those composed of soft calcareous rock or easily eroded tufaceous deposits. These caves, in some of the islands, as objects found near them show, were resorted to for mortuary and religious purposes. Many of the islands have no forests, few contain remnants of the original tropical jungles; others are destitute even of bushes; such an island as Antigua has no fresh water except that gathered in reservoirs.

Climatic and Hydrographic Conditions. The Lesser Antilles lie wholly within the tropics. Their temperature, however, is largely tempered by the ocean. The northeast winds blow so strongly that each island has two distinct climatic regions, the windward and the leeward, one under the régime of constant, cool ocean breezes and the other sheltered by highlands, with quiet water and low surf. As the islands have moderate elevation, the difference in temperature on the two sides does not profoundly affect the rainfall, although it has led to the concentration of a maritime people on the coast less exposed to surf raised by these winds.

The direction of the ocean currents has brought it about that, biologically, these islands are connected with South America, and we may suppose the original peopling of the majority of them was from that continent, either directly or indirectly. The great river, Orinoco, which discharges a volume of fresh water sufficient to render the Gulf of Paria, Venezuela, brackish, has had an important influence on the migration of plants and animals, especially marked in the fauna and flora of the southern members of the Lesser Antilles. Drifting logs that have floated from its delta to Barbados have no doubt carried reptiles, insects, seeds and even higher animals that would otherwise have been drowned. Floating trunks of trees, bushes and plants that could retain vitality in the salt water have been stranded on the islands. Paddles from Indian tribes dwelling in the Orinoco delta are, from time to time, found on the east coast of Trinidad. Ocean currents have likewise brought to the island organisms that live on the banks of the Amazon, and have, in that way, reached the Lesser Antilles from the land to the south rather than from lands to the west or north. But in the Greater Antilles, as Cuba, it is different; there the ocean currents set from the west, eastward, rendering these islands biologically allied to Central America rather than South America. The peopling of islands by man in early colonization follows much the same laws as that of plants and animals.

The South Equatorial Current crosses the Atlantic to the Caribbean Sea and, following the northeast and north coasts of South

America, impinges upon the shore, receiving what is discharged from large rivers and bearing its burden of life to its destination. There is little wonder that the Lesser Antilles, set like a net across its course, should capture some of the flotsam it bears. More than that, if the Gulf Stream can carry floating objects to Europe from the Gulf of Mexico, the Equatorial Current may have brought to the Lesser Antilles floating logs with clinging animals and plant seeds from the coast of Africa, across the Atlantic, not half the distance.

Biological Conditions of the Lesser Antilles. The land animals and plants, which practically supply the food of man, are largely dependent on the degree of heat or cold, moisture or dryness; in other words, on the climate of the region in which man dwells. The amount of heat and cold is due to elevation and latitude, ocean currents and prevailing winds, rainfall and other agencies. Moisture or dryness depends on the mutual relations of the earth, water, and air. The rainfall, land relief, nearness to the ocean, prevailing winds, ocean currents, and other causes, determine the character of the biota brought by ocean currents, winds or human agencies. This migration of the fauna and flora is partly voluntary, partly involuntary. Ocean currents have been perhaps the most effective agents in the involuntary transportation of plants and animals, but cultivated plants and domesticated animals have been carried by human agencies from one place to another. Such land animals as insects, lizards, and small mammals supplied considerable food, but there were no domesticated animals of size and the amount of food from terrestrial animals was never very large. The seas around the islands contain much animal food, as fishes, crabs, and mollusks, the last two being mainly collected from the shore laid bare by the high tide. Judging from the number of crab carapaces, and claws of the same, found in the middens on some of the islands, it would appear that crustacea supplied the aborigines with much of their food.

The importance of ocean currents, in the distribution of animal and plant life, has two aspects: (1) the regions of the adjacent continent to which the Antillean fauna and flora are related; (2) the animals and plants, occurring on these islands, that can be used as food. A distinction must be made between cultivated plants and domesticated animals brought by man, and those that have been transported by natural means, as winds or currents.

The food plants that played an important rôle in forming human culture on the Lesser Antilles in prehistoric times are the yuca or

manioc, the yam, potato, and various other roots. Maize may have been used as a food but not to the same extent as the roots above mentioned. The banana was made into a paste and dried in the sun; cocoa was grown by the aborigines, but not in great quantities. A favorite drink was an intoxicating liquor called the *ouycou,* manufactured from yuca meal which was fermented in large earthen jars. Most of these food plants were apparently brought by man from South America, his continental home. The flora of the Lesser Antilles is distinctly South American, and not allied to that of Central or North America.

In the same way it may be said that the fauna of these islands follows the same law; its natural affinity being with the great continent to the south. Few if any animals were carried to these islands by man in pre-Columbian times and it may be supposed that those used by man as food found their way there by natural means or unaided by man. The small mammals, reptiles, birds, and insects are akin to South America rather than to the Greater Antilles or North America. Several instances might be mentioned to illustrate this statement, but the following is sufficient, in a cursory treatment. The natural distribution of animals in the Antilles, according to Sir Harry Johnston, is well illustrated by the serpent fauna of Cuba, as compared with that of the Lesser Antilles: "In their serpent fauna," he says, "the southern groups of the Lesser Antilles (Guadeloupe to Trinidad) are more 'continental' and South American than is the case with the Greater Antilles." ... These last, be it noted, are absolutely unconnected, in the affinities of their reptilian fauna, with Florida and North America, but offer some relationship to southern Mexico and Central America. These indications as to past land connections or approximations are further borne out by plant, bird, spider, fish and mammal distribution showing that the Greater Antilles have had no nearer neighborhood with the North American continent since the middle of the Secondary epoch (if then); that their last ancient land connection (Early Tertiary?) was with Central and not with South America: and finally that they, to some extent, shared with tropical America a connection with, or approximation to West Africa, perhaps as late as the beginning of the Tertiary Epoch."[3]

As Johnston has shown, the relations of the bat fauna of the Greater Antilles (Cuba, Haiti and Jamaica) are important. According to this writer, out of twenty genera of bats only one is

[3] The Scenery of Cuba, Hispanola, and Jamaica. By Sir Harry Johnston. *The Geographical Journal*, June, 1909.

North American, three are peculiar to the Greater Antilles, and sixteen are found likewise in Central America.

Culture of Aborigines on the Lesser Antilles. Eliminating from our consideration Trinidad and Tobago, which belong culturally, as well as geographically, to the South American continent, we can detect traces of three distinct aboriginal cultures in the Lesser Antilles, *viz.*—(1) cave dwellers, or fishermen, hunters, fruit and root eaters; (2) agriculturists, "meal-eaters" ("Arawak"), who cultivated food roots by primitive methods; and (3) Caribs, a vigorous modification of the latter who obtained some of their food in the same way as the preceding, but lived mostly by raiding other islanders.[4]

It is probable that the most ancient aborigines of the West Indies inhabited caves, and it is known that survivals of these cave dwellers were mentioned in 1492 as inhabiting the western end of Cuba, the extensions on the western end of Haiti and Jamaica, which had become largely agricultural, and other islands. In many of these islands, however, traces of the cave life were even then archeological and legendary, but evidences of a preexisting cave life in all are almost universal. The agricultural or meal-eating culture was most highly developed in Porto Rico, Haiti and eastern Cuba, but traces of it existed in the Lesser Antilles, where the Caribs were dominant.

The inhabitants of the Lesser Antilles were more aggressive than those of the Greater Antilles, and among them a modification of the agricultural culture, called Carib, had been developed.

The derivation of Antillean man has been variously interpreted.[5] The available evidence seems to point to the conclusion that the original peopling of the Lesser Antilles was from South America, but we do not know whether, at the time it occurred, the Antilles were a part of that continent or of a much more extended island now partly submerged in the ocean. Early man may have inhabited the Antilles much earlier than is generally supposed, or at a time when those many likenesses in the biota of South America and Africa originated.[6] The aboriginal race had lived in Porto

[4] The word "Indian" is applied by the present West Indians to the coolies, or laborers who were imported from India to work in the fields. As pointed out by Mr. Payne, in his "History of America," the word "American" was applied to our aborigines up to the Revolution, but since that time it is generally used to designate a citizen of the United States. The present inhabitants of the Lesser Antilles call all prehistoric inhabitants of the island "Caribs" and all implements, pictographs, middens and pottery fragments are designated as "Carib."

[5] The reader will note that nothing is said about the provenance of the first human colonists in the Greater Antilles.

[6] There is considerable literature on resemblances between freshwater fishes, insects and other animals of South America and Africa.

Rico and Haiti long enough to have evolved a highly developed neolithic stone age culture, as evinced by the perfection it attained in stone working, unsurpassed anywhere in America. But there is evidence that the earliest man was a cave dweller, and that he was followed by an agriculturist and, the author believes, that the Carib was evolved from the agriculturalist ("Arawak"?) as a direct outcome of a food quest which could only be satisfied by plundering neighbors.

There are several theories regarding the origin of the Caribs in the West Indies. It is held by some of the early authors that this race was an offshoot from North America, but this theory is now quite generally abandoned. Others have derived the insular Caribs from South American Caribs mainly on the ground of linguistic affinities and certain legends which are not wholly reliable. That there are linguistic relations of continental and insular Caribs goes without saying, but there are also linguistic likenesses between all the known Antillean languages and those of South America, and it is yet to be shown whether this differentiation of the Carib language occurred before or after their ancestors left South America. Sir E. F. im Thurn has derived the Guiana Caribs from those of the Lesser Antilles, instead of the latter from the former. The author suggests the theory of an independent origin of the Caribs of the islands and those of the continent and ascribes their linguistic and other similarities to ancestral racial likenesses.[7]

If the Caribs in the Lesser Antilles originated from South America and were racially the same as those of the Orinoco, how does it happen that some of them did not settle in Trinidad, which lies between the Carib islands and Venezuela? The same implied objection, slightly modified, may be made to im Thurn's theory.

It may be that the indefinite use of the word Carib by some early writers has led to a grouping of all marauders into an unnatural group. Archeological objects found in these and other Lesser Antilles indicate a sedentary agricultural race of which the Caribs may have been renegades, not a distinct race culturally.

Cave-dwelling Culture. There are evidences that an original cave culture, which preceded the agricultural survivors in the Lesser Antilles, continued in the West Indies even when the inhabitants had practically passed into the agricultural state. As among the aboriginal pueblo people of our Southwest, cave dwellers

[7] The designation Carib, according to Oviedo, is an Arawak word meaning a warlike or fierce people, but not a distinct race. Dr. Chanca, to whom we owe the best account of the second voyage of Columbus, says that the Caribs occupied three of the Antilles, Guadeloupe, Dominica and Ay-Ay (St. Croix?).

and those who lived in habitations free from cliffs coexisted side by side, in early times, wherever there were caves. The prehistoric West Indian agriculturalists gave Ramon Pane legends of their former cave life, as has been elsewhere pointed out.[8]

The author's search for evidences that the numerous caves in Trinidad were inhabited was not rewarded with success. Several natural caverns near the pumping station, on the road from Port of Spain to Diego Martin's Basin, were explored with a hope that evidences of former habitation might be found in them, but these visits were not successful; and up to the present time, no evidences of cave dwellers has been reported from Trinidad. In Barbados, where there are geological formations that are readily eroded, caves are common and evidences of cave dwellers are not far to seek.

There are evidences that the series of natural caves at Mt. Gilboa in St. Lucy's Parish, Barbados, were inhabited in prehistoric times, and the so-called "Indian Castle," described by the Rev. Griffith Hughes,[9] in 1750, was undoubtedly artificially excavated by the hand of man. This "castle," which lies about three miles to the east of Six Men's Bay, in Barbados, is a remarkable excavation and, if aboriginal, as the author more than suspects, it is the only aboriginal, artificial cave recorded from the Antilles. According to the Rev. Mr. Hughes, prehistoric shell chisels and an idol, which he figures, were found in or near this cave.

An examination of the floors of rock shelters, common in Barbados, has yielded evidences that they were inhabited. Artefacts of aboriginal manufacture have been found near their entrances, showing that they were habitations. The resemblance of these implements to those found in fields indicates that their makers were culturally not very unlike those dwelling near the middens along the lee shore of the same island. Available evidence that the ancient Barbadians lived both in caves and in pit rooms or artificially excavated chambers will be presented in detail in a later publication.

Several other islands of the Lesser Antilles have natural caves where evidences exist of former habitation by prehistoric man. The marks of human tools are not wanting on the walls of these caves, but, thus far, no efforts at systematic exploration of their floors have been made. The following quotation from Father Labat is instructive as showing the use of caves as burial places: "There is to be seen at Désirade, a little island to the windward off the coast of Guadeloupe, a very deep cavern almost full of bones with re-

[8] Cave Dwellings of the Old and New Worlds. *Amer. Anthropologist.* 1900.

[9] The Natural History of the Island of Barbados. By Rev. Griffith Hughes, A.M., Rector St. Lucy's Parish, London, 1750.

mains of bows and clubs and other arms of the ancient Indians; it was apparently a cemetery."

According to an old author, the women of Martinique had caves in which they lived or to which they retired at times. "They have great and strong caves or dens in the ground to which they flee for safeguard in case any men resort unto them at any other time than is appointed, and then defend themselves with bows and arrows." These same caves may be the "holes" to which Davies refers when he writes, "Thus the Arouages are forced (by the Caribs) out of their holes, to fight in the open field or run away." While it is not impossible that some such structures as pit dwellings were referred to in these accounts, the logical conclusion would seem to be that they were caves or rock shelters.

No evidences of cave habitations were found at St. Kitts or St. Croix, but they have been reported from the island of Guadeloupe. In many of the Antilles, caves that once furnished habitations for man became mortuary or religious chambers. The use of caves for religious purposes in the Greater Antilles is well known. The author will instance one cave in the Lesser Antilles in which religious objects have been found although there are several others where mortuary remains have been discovered and therefore connected with ceremonies. This cave[10] is situated in Batowia, an island near Balliceaux, off St. Vincent; it has several niches in the walls one or more of which may have been used for idols. In this cave a sacred seat was found, several years ago, and taken to England, but its present whereabouts is unknown to the author.

Agricultural Culture. In almost all the Lesser Antilles the majority of aborigines had either abandoned cave life, and passed into the agricultural stage, or, as is generally the case, the two existed side by side. In those islands where there were no natural caves, it goes without saying that the inhabitants built huts in the open. The natives were agriculturalists and fishermen, including in the latter group those that made the shell heaps and middens, but this agricultural stage was not always uniformly developed; the objects found show diversity in form and degrees of technique and are more or less modified in different islands into typical forms. Certain well-defined subareas can thus be determined by the character of the artefacts which occur in certain islands or clusters of islands.

[10] This was the cave where the late Mr. Frederick Ober found the wooden turtle mentioned and figured by him in "Camps in the Caribbees," and by the author in his "Aborigines of Porto Rico."

This difference in culture areas in the West Indies, as determined by implements, may be illustrated by a comparison of the aboriginal objects from Porto Rico with those of the Lesser Antilles. Several typical aboriginal objects found in Porto Rico have not been duplicated in any other West Indian island except Haiti, and, conversely, many objects from the other Antilles have not yet been reported from Porto Rico. It may rightly be supposed that the forms of these prehistoric Porto Rico objects were evolved quite independently of those in other islands; and as these characteristic objects do not exist in either North or South America, it is probable that they originated on the islands where they are found. In the same way, many stone objects occur only in the Lesser Antilles, and do not recur on either continent, or on any of the Greater Antilles, which limitation very naturally leads to the conclusion that they also were autochthonous and restricted in origin to the islands where they are found. The archeologist can judge the characteristics of culture only by artefacts, and before he can classify prehistoric cultures in the Lesser Antilles, preceding the advent of the whites, it is necessary to examine large collections from each island, and compare them one with another in order to determine the types peculiar to geographical areas. This is somewhat difficult when the source of specimens is doubtful; and reliable only when large local collections are compared. A study of these shows that different islands of the Lesser Antilles were not uniform in culture, and has led the author to a division of the Lesser Antilles into subareas, based on cultural and geographical data.

The sites of habitations or refuse heaps in the Lesser Antilles are now indicated by middens and shell heaps. Buildings of stone or any form of walled enclosures may have existed but are not known to have been constructed by the aborigines of the Lesser Antilles. Even the stone circles, called ball courts or *batey*,[11] of Porto Rico and Haiti, have not yet been found in these islands. Mr. C. B. Brown, in "Indian Picture Writing in British Guiana," has described one of these *batey*, once supposed to be characteristic of the Antilles, from the Pacarima Mountains in Venezuela, an instructive observation connecting South American and Antillean cultures.

Contiguity to the sea is a necessity for fishermen, and the small inlets that rivers or streams make in the coast would afford good

[11] The author has been informed that there is an enclosure that may have been of this nature in Carriacou, but he has not visited it.

fishing as well as fresh water.[12] Another reason for dwelling near the streams is given by Davies, in the following lines: "The inhabitants of the Caribbees are also desirous to be somewhat near springs, brooks and rivers because of their washing themselves every morning before they put the red paint on their bodies."[13]

Two kinds of houses, known as the secular and religious, were constructed by the aborigines of the West Indies, as is almost universally the case with man in primitive stages of culture. The latter served as the habitation of the head medicine man, or chief, but was also the god house or place where the idols (Zemes) were kept. It was generally larger than the other dwellings and occupied a more central position, the huts of the remaining people being commonly grouped about it. As these houses are described by many authors, one of the best, that from Labat, will serve to show their character: "Each family" he says, "composes its own hamlet, for the father of a family has his house where he lives with his unmarried children and wives, all the other children who are married have their establishment and their respective houses. They build one house common to all, called a carbet, which has a length of sixty or eighty feet, and is constructed of forked boughs, eighteen or twenty feet high, planted in the ground every twelve feet. They lay over these, branches of the latimer or other trees, perfectly straight, which answer as a plate on which they place the rafters extending down until they touch the earth; these they cover with reeds or the leaves of the Bourbon palm; so that it renders the interior of the carbet quite obscure, for no light enters except through the front door, which is low and only allows one to enter by bending down. The boys keep the carbet clean and sweep out the house and surrounding plaza. The girls and women clean their houses, [the men and boys the sacred house.] At the side of this carbet there is one special door by which the priest enters when his god calls him: he alone is allowed to pass this door."

The aboriginal villages of the West Indian agriculturalists, the sites of which are now indicated by middens, were probably not unlike those in Guadeloupe, described as follows:

"Here they found innumerable villages of twenty or thirty houses, at most, set round about an open space, like a market place." "And forasmuch," says Peter Martyr, "as I have made mention of their houses, it shall not be greatly from my purpose to describe

[12] While it is not unusual to find evidences of village sites situated inland, from necessity they rarely occur very far from fresh water, and are generally on the coast.

[13] The early accounts generally state that the Caribs were painted by their women.

in what manner they were builded. They were made round like bells or round pavilions, their frame is raised of exceedingly [high] trees set close together and inserted in the ground, so standing aslope and bending inward that the top of the trees join together and bear one against another, having also within the house certain strong and short posts, which sustain the trees from falling. They cover them with the leaves of date[?] trees, and other trees strongly compact and hardened wherewith they make them close from wind and weather. To the short posts or props within the house they tie ropes of the cotton or gorsapine trees, or other ropes." . . . . "At the entrance of one of the houses they found two wooden statues, with serpents wreathing round their feet, and they found looms, in which the natives wove a sort of carpet, and all kinds of earthen vessels."

The sites of these villages are now indicated by low mounds or middens, sections of which are often revealed by encroachments of the sea or by streams flowing near them.

As skeletons sometimes occur in these sites, reference to burial customs may be mentioned here. The ancient Antilleans buried their dead in a contracted (embryonic) posture, often in the floors of the houses; and we have an early record of a chief of Dominica who was buried in the middle of his dwelling, after which the house was abandoned. The natives were accustomed to make the grave in the same house where the person died, or in a new house built for that purpose. The dead were sometimes seated on their heels, the two elbows on the two knees, the head resting in the palms of the two hands. The author has found burials in the Carib cemetery at Banana Bay, in the island Balliceaux,[14] in the same position as above described by Labat. It was customary to deposit mortuary offerings in the graves, which accounts for the pottery and other objects found by the author in the Balliceaux cemetery. The middens are commonly composed of thin layers of ashes with charcoal in which are scattered shells of mollusks, clams, pottery fragments, broken stone implements, and other objects of stone, shell or bone. These refuse heaps have shells scattered through them, but shells predominate only when the people who constructed them used mollusks for food, true shell heaps being composed almost entirely of shells, although containing rejects, as abandoned implements or utensils.

The author found a few true shell heaps in the Lesser Antilles,

[14] After the Carib war in St. Vincent, the Black Caribs were first removed to this island and later transported to Roatan, off the north coast of Honduras.

but one at Erin Bay (near where Columbus landed) in Trinidad was large and yielded many objects similar, with the exception of the pottery, to those found in South America.

On a mound situated on a marl hill, supposed to be the site of a former village in the northern part of Barbados, there were broken fragments of pottery, and very little else, most of the mound, which was formerly a midden, having been largely washed away.

Artefacts. Artefacts, from the West Indian islands visited by the author, consist of stone implements, pottery, carved shell and bone and other objects. They have a marked difference, especially the stone implements, in different areas or groups of islands. There is not only a difference in the stone of which the implements are made, but also variations in their forms. This localization of stone implements was noticed especially in St. Vincent, St. Kitts, and Santa Cruz. Certain forms of implements, as the almond-shaped celts, are found throughout the whole extent of the Greater Antilles, Porto Rico, Haiti, and Eastern Cuba, where they constitute 90 per cent. of all the stone objects. These petaloid and almond-shaped stone implements occur almost universally in the Lesser Antilles from Santa Cruz to St. Vincent, becoming less abundant on the southern islands, where the proportion has dwindled to 10 per cent. or less. Here, on the other hand, the proportion of axes with blunt or winged heads, a form not occurring in the northern region, has increased to 90 per cent. of all the stone implements.

Pottery with handles in the form of bizarre heads occur from Porto Rico to Trinidad, appearing universally in all the islands.[15] The pottery found in each group of islands is distinctive; that from Porto Rico, for example, differs from that of the volcanic islands, and the St. Kitts style is unlike that from Trinidad, the Grenadines or Barbados.

Pottery and basket making as now practiced by the natives of several of the Antilles are lineal descendants of Indian arts and often Indian names are retained by modern potters. At present the potter's wheel is not used and pottery is baked by modern natives in much the same way as by the Indians, several centuries ago. Wherever the clay is suitable, the potter's art is still practiced and fair products are now sold generally in some corners of the open market places. Not only has the art of pottery-making been transmitted by the aborigines but also prehistoric forms and decorations

[15] At Nevis, for instance, the aboriginal styles and ornamentation are still preserved by the present natives.

have been preserved. Although the character of pottery and its decorations vary somewhat from island to island,[16] our collections are not as yet ample to differentiate one from another. We find the prevailing colors are red and white and sometimes brown, but a glazed fragment has yet to be seen. The decorations are generally incised or in high relief.

The so-called "monkey" goblet, or vase with a tubular snout appended to one side, is a good example of a form lineally descended from an aboriginal pattern. Several prehistoric specimens of these, somewhat modified, are known from collections made in Barbados and St. Kitts. The handles are somewhat differently arranged from those on typically modern monkey vases, but the essential snout, resembling that of a modern teapot, is always present.[17] The human face, heads of birds, and reptiles, especially the turtle,[18] are constantly represented on handles and effigy vases from the Little Antilles.

A study of types of implements, stone or shell, and the variations in form and decoration of pottery have led the author to classify the aboriginal cultures of the Lesser Antilles as follows:

1. Barbados is culturally as well as geologically and, in a manner, biologically a distinct archeological culture area.

2. Prehistoric objects from Trinidad and Tobago archeologically resemble those from the north coast of South America.

3. The archeological objects from the volcanic islands from Grenada to the Anegada passage are divided into two groups, one of which is illustrated by the beautiful collection from St. Kitts, made by Mr. Connell; the other by numerous objects from St. Vincent. These indicate two cultural areas in this geographical area.

4. Santa Cruz and St. Thomas have cultural resemblances in their antiquities to the Porto Rican or Jamaican area.[19]

Carib Culture. The materials indicating the so-called Carib culture cannot be distinguished from those of the agricultural people of the volcanic islands of the Lesser Antilles, although their mentality is characteristic. The Caribs are regarded by the author as having originated from a preexisting agricultural people, who lived much the same as the agriculturalists from which they sprang; but

[16] Bowls, vases and jars from Trinidad and the Grenadines have a raised base or appended ring which do not occur in the northern islands.

[17] The author obtained from the natives of Nevis, who are fairly good potters and expose their wares for sale on the quay at St. Kitts on market days, a "monkey" vase almost identical with the aboriginal. The saucer of this vase, like the aboriginal, is ornamented with finger tips and both pieces closely resemble pottery found in middens of St. Kitts.

[18] The frequency with which turtles and their heads occur on ancient pottery handles and effigy bowls suggests that this animal was widely worshipped, as it naturally would be, being a common food of the aboriginal people.

[19] A close comparison of these areas can be shown only by technical descriptions and figures which are not practicable in this article.

they were great warriors and were hostile to their ancestors. Archeologically the objects belonging to them are not characteristic of Caribs as such, although each group of islands has a distinctive form of implement and characteristic pottery. Sir Everard F. im Thurn, relying in part on traditions to that effect, derives the Guiana Caribs from the insular. The South American Arawaks, he says, speak of incursions of Caribs from the islands, not from up the Orinoco River. According to Brett, the Warrau maiden, Korotona, gave birth to a being of human serpent form, who afterwards became the first Carib, thus making the Caribs descended from the Warrau. There is a tradition among the Arawak that the Carib tribe in former ages lived in the island to the north (Lesser Antilles).

Effect of Environment on Culture in the Lesser Antilles. The culture of man in the Lesser Antilles follows a general law and is largely the result of two causes, heredity and environment. Certain fundamental traits of culture that have possibly originated under other conditions have been modified or completely changed by the necessity of early ancestral colonists conforming to a new environment; others have not been changed owing to conservative tendencies and have remained more like those from which the race sprang. Among the latter traits may be mentioned languages, mythologies, and especially anatomical features. Among the mutable characters are those productions ordinarily indicated by the material culture. Roughly speaking, the volcanic islands were inhabited by Caribs, and, as these volcanoes were frequently in a state of activity, they were a constant menace and profoundly affected the culture of these people, often driving them to make inroads on islanders who were agriculturalists and had their homes on more stable islands. We know that, when circumstances or sociologic conditions change, insular men are driven to migrate from their homes into new lands beyond the seas and that these emigrants are naturally attracted to places where their former environment is most closely reproduced. This is one reason why there is a close relation between geographic environment, fauna, and flora of islands and human cultures. The migration of man is partly governed by the same laws as those governing animals and plants; but in casting about for a home, migratory man chooses, as far as possible, a habitat like that he has left; migrating animals and plants have not the choice, but they naturally survive under conditions like those they left in preference to new conditions to which they are not acclimated. It takes a long time and means changes amounting to specific differences, for a plant or animal to become acclimated, but man can

change his culture to meet the requirements of a new environment, although it also takes a long time for him to develop such cultural differences. Hence the difference in artefacts found in different islands of the Lesser Antilles indicates a long continued residence.

The stability of a non-volcanic island is conducive to a peaceful agricultural life rather than warlike mental tendencies. Under these conditions man has no incentive to raid his neighbor; but a volcanic island, with an eruption every three or four generations, develops and fosters the marauding spirit. As long as there was an incentive in physical conditions, due to volcanism, the inhabitants kept up warlike habits and marauding tendencies persisted.

Hurricanes, as well as volcanic disturbances, have often driven the so-called Caribs to raid other islands for food. Iñigo (p. 120), in giving the results of the hurricane in Porto Rico in 1530, ascribes the failure of food in that year as the cause of a raid on Porto Rico of the Dominica Caribs under Jaurebo; and there is every reason to suppose that frequent raids took place in prehistoric times for the same reason that Jaurebo made this incursion.

A study of the Antillean culture shows that some of these islands have changed their physical conditions,[20] while inhabited by man, to such an extent as to affect the food supply at times and this economic change has led to migrations and consequent modifications in culture. A small island will support a population up to a certain number, but when that population increases beyond a limit several things may occur. First, the inhabitants may invent a new method of increasing the food supply that the island yields, or, second, a migration of the surplus population to other islands may take place, either in the form of colonization or predatory expeditions. The so-called "Carib islands" are as a rule volcanic, and these volcanoes have been so often active that their frequent eruptions became a menace to agriculturalists. Each eruption not only killed many natives but also, by covering the fields with ashes and lava, destroyed the food supply of many others. At the time of such a calamity the survivors were naturally forced to obtain a food supply elsewhere, which led them to raid the neighboring islands. Continued catastrophes, from generation to generation, may even have permanently modified the mentality of the inhabitants of volcanic islands, affording an instructive example of the psychic influence of environment. When a renegade band had overcome the inhabitants of one of the islands it obtained a footing

[20] The eruption of the Souffriere in St. Vincent in 1903 devastated the whole "Carib community" and almost blotted out the race in that island.

from which to make excursions to others, for plunder. As some of the smaller of these islands seemed to be depopulated by men, who were really absent on distant marauding excursions, it is natural to say, as some of the early explorers did, that they were inhabited by women only.

The agricultural people of the islands are probably those of whom Davies writes: "These Arouages then are the people whom our Islanders (Dominica Caribs?) go and find out in their own country, commonly twice a year, to be revenged on them as much as they can. And it is to be observed on the other side, that the Arouages never make any attempt on the Caribees of the Islands, in the islands where they live, but only stand on the defensive; whereas they are sure to have our savages among them oftener than they wish, coasting along, as they are wont to do, all the other islands wherein they have Gardens, or Colonies, though the furthermost of the Caribby islands, which is Santa Cruz, is distant from the Country [21] of the Arouages about three hundred leagues."

The so-called insular and continental Caribs of South America are said to have linguistic similarities, but this likeness does not prove that the two have a close consanguinity. All depends on the relationship of the mothers or the women whom the Caribs in the two regions married and by whom they had children. We hear very little of them except that they spoke a different language from their lords and the probability is that they never spoke Carib. If so, their children are not Caribs but products of another stock. Marriage outside the race early gave rise to the union of African slaves wrecked on the island Bequia, and the yellow "Caribs" of St. Vincent. Although the inhabitants of Guadeloupe, Dominica, Martinique, and St. Vincent are preeminently called insular Caribs, they cannot be the same racially as the Caribs of the Orinoco, but both may be a modified type of mixed character, one of which was peculiar to the islands where they were evolved; the other to South America, but belonging to a related linguistic stock.

Man does not, as a rule, migrate from a home in which he has become acclimated simply for a change, but is generally driven by scarcity of food to seek a home where conditions are like those which he has left. This food quest and the desire to better their condition are the most potent causes that have impelled men to migrate.

[21] The country of the Arawak here referred to may be Cuba, Porto Rico, Haiti, or South America.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Gift of Dutch Charts for the Society's Map Collection. The Hydrographic Office of Holland recently presented the Society with a complete set of its charts. The main value of this collection lies in the original data it contains on the coasts of the islands belonging to Holland in Asia and Australasia. The charts consist of recent editions with corrections recorded and constitute a valuable addition to the source material available for the Society's work.

NORTH AMERICA

A Survey of the Vegetation of New York. The New York State College of Forestry, for two years, has been doing educational work in forestry throughout the State. It has also been carrying on, at the State Forest Experiment Station, Syracuse and at other points, an investigation of forest conditions and problems connected with their development, protection from diseases and insects, and proper management. As extension work in agriculture is based entirely upon what is being accomplished in the agricultural experimental stations of the country, so too must further extension work be based upon such work as is being done in the State Forest Experiment Station at Syracuse and upon investigations of forestry problems in other parts of the State.

In the investigation of the wood-using industries of New York, carried on by the United States Forest Service and The New York State College of Forestry, it was seen, on every hand, that there is great need of a broader reconnaissance survey of the forests of the State. Such a survey of the plant life of the State will furnish a back-ground and a basis upon which the progress of research will stand out in clear proportions. Such surveys of life conditions, within a limited area or within a State, have come to be regarded as essential in working out any policy of conservation of natural resources. The National Conservation Congress has advocated the extension of biological surveys in connection with conservation programs in the several States.

It is recognized by foresters that the native vegetation of a region furnishes the only sound index as to its cultural possibilities; this is true whether it is in the raising of forests or the cultivation of other crops and this basic idea is a strong additional reason for such a plant survey of the State of New York.

This State presents many exceedingly interesting and diverse features in its physiography and surface covering and equally diverse aspects of vegetation. So far, no comprehensive analysis of these vegetation types has been made, neither has there been any general mapping of their extent or description of them. The general survey to be undertaken by The New York State College of Forestry will define these different aspects of vegetation and show their connection with surface and soil conditions. From such a survey it will be possible to develop the history of plant societies and their relation to commercial forest development; and all this will define, as nothing else can do, the position of New York State in relation to the large vegetation zones to the north, the south and west.

The reconnaissance survey of the plant life of this State is now being carried on by Dr. William L. Bray, who began the work last spring. Dr. Bray is in charge of botanical instruction in both the University and the State College of Forestry, and, as he has a leave of absence for a year, he is spending this year in a line of work which he pursued with distinction in the southwest, in his studies of the vegetation of Texas, published in a series of bulletins by the United States Forest Service and the University of Texas.

Information on National Parks. A set of useful circulars containing general information on National Parks is issued each season by the Department of the Interior. These publications contain valuable suggestions regarding convenient routes to these reservations as well as concise descriptions of the grounds and features of interest. Hotel, camp and transportation rates are given, and distances to principal points shown in tabulated form. A list of books and magazine articles relating to the parks is inserted in each pamphlet. Regulations governing conditions under which residence and travel in the parks are allowed are also provided. A separate circular is issued for the Glacier, Yellowstone, Crater Lake, Yosemite, Mesa Verde, Mount Rainer and the Sequoia and General Grant National Parks. These publications may be obtained free by written request to the Secretary of the Interior or by personal application to the office of the Superintendent of the Park.

The Glacial Great Lakes. The advance publication of a chapter from a U. S. Geological Survey monograph gives the latest information regarding the glacial Great Lakes (F. B. Taylor. The Glacial and Postglacial Lakes of the Great Lakes Region. From the Smithsonian Report for 1912, Washington, 1913, pp. 291-327). Taylor says the stream-carved valleys of the great lakes were not occupied by lakes before the glacial period. His brief outline of the history of the Great Lakes differs notably from that which he presented over seventeen years ago (Studies in Indiana Geography. Terre Haute, 1897). This progress is due especially to Taylor's own work, Goldthwait's precise levelling, and the work of Leverett, Alden, and others in tracing the moraines in their relation to the levels of abandoned beaches.

Six of the salient stages of lake development, illustrated by excellent maps, are: (a) The first small lakes—Lake Chicago in the Michigan basin and Lakes Maumee and Saginaw in the Erie and Huron basins with independent Wabash and Illinois River outlets; (b) The Lake Whittlesey stage, with outlet into Lakes Saginaw and Chicago; (c) enlargement of the above to the Lake Warren stage (Chicago outlet) marks the inclusion of the Finger Lakes of New York, which were previously drained by the Susquehanna; (d) The Lake Duluth, Lake Chicago, and Lake Lundy stage includes some new features, for while the Duluth and Chicago outlets were independent, Lake Lundy (including Lakes Dana and Elkton) had shifted the waters of Lake Warren from their westward course by the Grand outlet into Lake Chicago to an eastward course by the Syracuse outlet to the Hudson. (e) Lake Algonquin had two outlets during parts of its history, southward past Chicago and southeastward by the Kirkfield outlet into Lake Iroquois and then, by the Mohawk outlet, to the Hudson-Champlain estuary. (f) The Nipissing Great Lakes, with the Ottawa outlet, seem to have been coexistent with predecessors of Lakes Erie and Ontario which had begun to use the St. Lawrence outlet.

This summary fails to present half the complicated condition of our present knowledge as outlined by Taylor. Lake Algonquin, for example, had four important stages and the Nipissing Lakes at least two, in each case with shifting outlets. The use of the Niagara gorge as a measure of post-glacial time is practically upset by Taylor's positive statement that the Niagara River has been twice robbed of the waters of the three upper Great Lakes, of course for unknown lengths of time.

The student of glacial geology will find many new points in the discussion, for the discovery of the hinge lines and the working out of isobases for various stages of the several lakes has introduced many complications in the history, which Taylor handles in masterly fashion. The early part of the history of Lake Duluth and of possible relations of Lake Agassiz have not yet been settled. The lack of knowledge of the moraines north of Lake Superior in Canada leaves the possible complication of a detached ice block there to be explained or eliminated. The complication of postglacial marine waters in the Ottawa, St. Lawrence-Ontario basins is less troublesome.

Taylor's closing suggestion is of much interest in connection with certain of the views of Suess. "The preponderance of present evidence appears to be only slightly in favor of resilience following depression by the ice weight as the main cause of the uplifting of the land and the deformation of the shore

lines in the region of the Great Lakes. Standing as a close second to the hypothesis of ice weight is the possibility of deformation of the beaches by uplifts of the land incident to crustal creeping movements, which are simply the most recent impulses in a long process of continental growth reaching back into the Tertiary age. If certain evidences which are now supposed to indicate relatively recent crustal creep toward the southwest are substantiated, the hypothesis of resilience following depression by ice weight seems likely to become of secondary importance.''

LAWRENCE MARTIN.

State Railroad Maps of the United States. State railroad maps are generally published by state railroad commissions. The following table compiled by Leon Dominian and published in the issue of the *Railway Age Gazette* (Jan. 16, 1914), shows which of the states of the union have issued railroad maps:[1]

STATE	PUBLISHER	PLACE OF PUBLICATION	DATE OF LATEST EDITION	SCALE OF 1 IN. TO—
Connecticut[2]	Connecticut Railroad Commissioners	Hartford	1912	6 miles
Florida	Department of Agriculture	Tallahassee	1912	10 miles
Georgia	Georgia Railroad Commission	Atlanta	1911	13 miles
Illinois	Illinois Railroad and Warehouse Commission	Springfield	1913	8 miles
Indiana	Railroad Commission of Indiana	Indianapolis	0-0-0	0-0-0
Iowa	Iowa Board of Railroad Commissioners	Des Moines	1910	8 miles
Kansas	Public Utilities Commission	Topeka	0-0-0	0-0-0
Kentucky	Kentucky Railroad Commission	Frankfort	1910-14	7.2 miles
Louisiana	Railroad Commission of Louisiana	Baton Rouge	1914	8 miles
Maine	Maine Railroad Commissioners	Augusta	1913	8 miles
Massachusetts[3]	Massachusetts Board of Railroad Commiss'rs	Boston	1913	7 miles
Michigan	Michigan Railroad Commission	Lansing	1908	?
Minnesota	Minnesota Railroad & Warehouse Commiss'n	St. Paul	1913	10 miles
Mississippi	Mississippi Railroad Commission	Jackson	1911	13.3 miles
Missouri	Missouri Railroad & Warehouse Commission	Jefferson City	0-0-0	0-0-0
Montana	Montana Railroad Commission	Helena	1913	12 miles
Nebraska	Nebraska State Railway Commission	Lincoln	1911	10 miles
Nevada	Railroad Commission of Nevada	Carson City	1911	15.5 miles
New Hampshire	Public Service Commission of New Hampshire	Concord	1908	11.5 miles
New Jersey	New Jersey Board of Pub. Utility Commiss'rs	Trenton	1912	7 miles
New York	New York Public Service Commission	Albany	1912	7.5 miles
North Dakota	North Dakota Commissioners of Railroads	Bismarck	1913	6 miles
Ohio	Department of State	Columbus	1912	?
Oklahoma	Oklahoma Corporation Commission	Oklahoma City	1913	10 miles
Pennsylvania[4]	Pennsylvania State Railroad Commission	Harrisburg	1912	6 miles
Rhode Island	Public Utilities Commission	Providence	1914	1.25 miles
South Carolina	Railroad Commission of South Carolina	Columbia	1912	15 miles
South Dakota	South Dakota Railroad Commissioners	Pierre	1910	12 miles
Tennessee	Tennessee Railroad Commissioners	Nashville	1908	12 miles
Texas	Texas Railroad Commission	Austin	1913	18 miles
Vermont	Pub. Serv. Commis. of the State of Vermont	Newport	1912	4 miles
Washington	Public Service Commission of Washington	Olympia	1911	8 miles
Wisconsin	Railroad Commission of Wisconsin	Madison	1912	10 miles

In addition to these railroad maps, U. S. Geological Survey state maps on a scale of 1:500,000 are now available for the states of Alabama, Arkansas and Delaware. These sheets show the lines constructed. An excellent topographic map of Colorado showing railroads in operation and proposed was issued in 1913 by the State Geological Survey. This map is on a scale of 1:500,000 and is based on one of the still unpublished state maps compiled by the U. S. Geological Survey.

[1] A railroad map of the Territory of Alaska will be found accompanying the report of the Alaska Railroad Commission published as House Document No. 1346, 1913, Government Printing Office, Washington, D. C.

[2] A separate map of the street railways of Connecticut is also published on a scale of 1 in. = 3.2 miles, by the same commission.

[3] A map of the street railways of Massachusetts is also published on a scale of 1 in. = 4 miles, by the same commission.

[4] Two maps are published by this commission: (a) steam railroads and (b) electric railways.

0-0-0 These states have not published any railroad maps in recent years.

Exhibition of Mexican Coinage and Medals. The Constitutionalist forces in Mexico have coined money in silver and copper. These coins were struck at Parral, Chihuahua, and are very crudely done; in fact they are about the crudest coins that have been made in many years. Three of them have recently been brought to New York, and are now on exhibition in the Museum of The American Numismatic Society, Broadway, at 156th Street. The Peso dollar has on one side simply "H DEL PARRAL 1913" in a wreath, and on the other side "1 Peso."

The Half Dollar is more pretentious though very crude. On one side is the inscription, "Fuerzas Constitucionalistas 1913" (Constitutional Forces), and, in the center, a liberty cap surrounded by rays, a copy of the older style of Mexican coins. The reverse has "50 Centavos" in a wreath, a poor copy of the coinage of Huerta. A specimen of this latter, dated 1913, is also shown. The copper piece, which is said to have been made from copper trolley wire melted down, is similar to the 50 Centavos, but has "2 C" in a wreath for 2 Centavos.

Appreciating the general interest in Mexican affairs, the American Numismatic Society has had on exhibition for some months, a collection of Mexican coins, medals, and decorations. These begin with Mexico under Spain; and the first coins were the earliest money coined in America, during the reign of Charles and Johanna in 1516-1520. Various coins of Spanish rulers are also shown. During the reign of Ferdinand VII the various possessions in the New World began to throw off the Spanish yoke, and an interesting series of crude necessity coins are shown. These were struck by both factions. The Central Junta, in behalf of the monarchy, struck money in Mexico City, Durango, Zacatecas, Chihuahua. Money was also struck in the field by Gen. Vargas, at Sombrerete, and by the Revolutionary army of the South under the patriot Morelos in 1811-1814.

Another leader, in 1821, Gen. Iturbide, succeeded in making Mexico independent, and the next coinage was of this man as Emperor under the name of Augustin. On the abdication of Augustin, in 1823, begins the Republican coinage which has continued to the present time except during the days of the ill-fated Empire under Maximilian, 1864-1867, when a series bearing this unfortunate man's head was produced.

Various medals, orders and decorations issued by the Mexican Government are also shown. Our war with Mexico, in 1845-1848, is illustrated by several medals awarded by the Government to Generals Scott and Taylor and by a number of medals awarded by several of the States of the Union to different officers and soldiers. Besides these are shown a number of badges worn by members of organizations of Mexican War Veterans.

The Southern Geographic Society. This Society has recently been established at Knoxville, Tenn. Its President is Charles H. Gordon, Professor of Geology at the University of Tennessee; Recording Secretary, E. E. Patton, instructor in Commercial Geography, Knoxville High School. The Society's aims are: (1) To encourage inquiry and research into subjects of geographical interest; (2) To encourage geographical instruction in the universities, colleges and schools of the South, and to assist in building up in Knoxville, and elsewhere in the South, collections, in libraries and museums, of books and pamphlets, maps and atlases, photographs and other illustrative material bearing on geography; (3) To promote the exploration of unknown or little known regions and to publish or aid in publishing the results; (4) To organize and conduct geographical excursions, and to conduct, in connection with the Summer School of the South, a field school of geography. Monthly meetings will be held from October to May, inclusive, at which addresses or lectures will be given. From time to time, excursions will be conducted by the Society. Beginning with next summer, it is proposed to conduct in the mountains, for four or six weeks, a camp school for the study of geography and related subjects, including plants, animals, physiography, geology, forestry, etc. Excursions will be made under competent instructors for the study of the flora, the fauna and the physical features of the region.

The late Professor Tarr's Posthumous Works. The Macmillan Company is just publishing "College Physiography," by Ralph S. Tarr, late

professor of Physical Geography in Cornell University. The book was practically completed by the author before his death in 1912. It has been edited by Dr. Lawrence Martin, Associate Professor of Physiography and Geography, University of Wisconsin, who has illustrated it and prepared it for publication in accordance with the plans of Professor Tarr. The book has been awaited with much interest, as the author's high qualifications for writing it, it was believed, would result in a text of exceptional value for use in the higher schools and in libraries.

The National Geographic Society announces the publication of "Alaskan Glacier Studies" by Profs. Tarr and Martin, based upon field work in 1909-1911 and 1913. Both these books will soon be reviewed in the *Bulletin*.

Geographical Lectures at the Summer Session of Columbia University. These lectures were delivered under the auspices of the Department of Geography:

July 20, "Climatic Changes and their Geographic Effects." Illustrated. Professor Ellsworth Huntington, Yale University.

July 29, "The Motions of our Earth, demonstrated with the Foucault Pendulum and experiments with Rotating Bodies. Professor Harold Jacoby, Columbia University.

August 5, "The Scenery of American Rivers." Illustrated by colored lantern views. Professor Douglas W. Johnson, Columbia University.

August 12, "Ancient Sea Margins in the Hudson and Connecticut Valleys." Illustrated. Professor Herman Le Roy Fairchild, University of Rochester.

Explorations and Surveys in Canada. Mr. R. W. Brock, Director of the Geological Survey of Canada, informs the Society that the Geological Survey has sent out an expedition to the Athabasca Lake District in charge of Mr. Charles Camsell of the Survey. Mr. Camsell will explore the country between Black Bay, Lake Athabasca, to Christie Bay, Great Slave Lake, between the Great Slave River and Dubawnt River, filling in as much as he can of this blank in the map of Canada. A biologist, sent out by the Biological Division, accompanies him to make notes on and collections of the flora and fauna of the region traversed. Mr. F. J. Alcock will study the geology of the north shore of Lake Athabasca and Mr. A. G. Haultain, topographer, will make a survey of Lake Athabasca, on a scale of four miles to an inch, to be used as the hub control for all exploratory surveys in the surrounding country. An ethnologist, sent out by the Anthropological Division of the Survey, accompanies the Lake Athabasca party.

Other work arranged for is the topographical mapping of the Chilkat map area, extending from the British Columbia-Alaska boundary line district parallel to the Chilkat River. The map area is 1,000 square miles and will be mapped on a scale of four miles to an inch, with 250 feet contours. Mr. W. E. Lawson is the topographer in charge.

Mr. F. S. Falconer, topographer, is surveying the Jordan River sheet on the same scale. This map area is 1,500 square miles and lies between 118° and 119° W. and 51° and 51° 30″ N., and includes the portion of the Columbia River Valley between Revelstoke and Carney. This map sheet should be interesting to geographers in connection with the subdivision of the mountain systems of the Canadian Cordillera.

Mr. A. C. T. Sheppard, topographer, is completing the Flathead sheet along the Continental Divide just north of the International Boundary line; and is also beginning a new standard sheet in the Crows Nest area, on a scale of four miles to an inch, with contours of 200 feet. This sheet lies between 114° and 115° N., and 49°30″ and 50° N.

Mr. E. L. Bruce is making an exploratory survey, with special reference to geology, of the country north of the Pre-Cambrian—Ordovician boundary east of Sturgeon Weir river, south of 55° N., and east of the Hudson Bay R.R.; and Mr. D. D. Cairnes is making a general reconnaissance of a belt between Dalton Post and Canyon City, including the eastern edge of St. Elias Range, Yukon Territory.

"Colds" and Weather Conditions. Our common colds are little understood. The name suggests the popular belief in the relation of this disability to low temperatures, draughts of air, and general chilling. Dr. C. M. Richter, of San Francisco, has made a study of "Colds and their Relation to the Physics of the Atmosphere" (*Med. Record*, Dec. 6, 1913). The conclusions reached, from meteorological and physiological points of view, seem reasonable. Dr. Richter believes that colds depend primarily on an excess of moisture in the air we inhale. This excess is found principally during cyclonic weather, especially when a period of very dry weather has preceded. The excessive nasal secretion relieves the respiratory apparatus from the otherwise damaging effect of an overcharge of moisture, and is analogous to the profuse perspiration of the outer skin which takes place under certain conditions of temperature and humidity, forcing better conditions for evaporation. Latent microbism becomes active on the mucous membrane after these air conditions have, for some time, favored its development. Microbism, in the author's opinion, is very rarely the primary cause of an acute cold. R. DEC. WARD.

AFRICA

A Geographical Result of the Nigeria-Kamerun Boundary Demarcation. Captain W. V. Nugent, describing the geographical results of the Nigeria-Kamerun Boundary Demarcation Commission, 1912-13, says: "It is worthy of note that the Benue itself, as well as its three great southern tributaries, all of which rise on the plateaus of the central Kamerun, only become navigable for canoes near the points at which they cross the boundary into Nigeria. These limits of navigation have naturally had an important effect on the distribution of man over the country—the more civilized peoples inhabiting the plains, where trade routes are numerous and easy, while the savage pagan tribes, who care nothing for trade and only want to be let alone, have withdrawn to the almost inaccessible hilltops. It has yet to be proved, however, that the inhospitable Kamerun mountains do not contain a far greater source of wealth, in the shape of undeveloped minerals, than the wide, cultivated plains of Northern Nigeria."

EUROPE

The Nineteenth Congress of German Geographers. The nineteenth Congress of German Geographers, which meets every two years, was called to order by Prof. Dr. H. Wagner (Göttingen), in the auditorium of the University of Strassburg on June 2nd. Words of welcome were expressed by representatives from various local committees and associations after which Prof. A. P. Brigham, President of the Association of American Geographers, extended the good wishes and sympathetic interest of both its members and of American geographers in general. On behalf of the German geographers, Dr. Wagner expressed the hope that international cooperation among the countries on both sides of the Atlantic might continue to be stimulated.

The programme (June 2-7 inclusive) was divided into three main parts: 1. The reading of papers; 2. An exhibition of ancient and modern maps of Alsace-Lorraine, of instruments and maps used or produced by the Prussian Land Survey, and of a series of maps prepared by Dr. Spahn, illustrative of the development of German newspapers in relation to the progress of transportation facilities from 1600 to 1900; 3. Excursions.

The papers were included under the following topics: 1. Results of Recent Exploration; 2. Geographic Instruction; 3. Earthquakes; 4. Geography of Alsace-Lorraine; 5. Migration of Various Tribes. Although none of the papers presented notably new thought, many of them were of a high order of interest. To mention a few titles, Dr. Filehner (Berlin) and Dr. Heim (Munich) gave illustrated accounts of their expedition to the Antarctic Dr. F. Thorbecke (Heidelberg) discussed the geographic work done in connection with exploration in Central Kamerun from 1911-1913. In talks by Dr. Langenbeck, Dr. Krause and Dr. Wolfram all of Strassburg, the geology and geography of Alsace-Lorraine were made clear.

It is perhaps noteworthy in the annals of the German Geographers that no little attention was given to the place of women in the educational field. Prof. H. Fischer (Berlin) presented a paper entitled "Erdkunde (Geography) in Schools for Girls." He concluded, among other things, that since the girls represented the mothers of the future, such geography should be taught them as would develop patriotism and stimulate a keen interest in their country. They would thereby become better equipped to teach their children love for the Fatherland and so aid in strengthening the nation.

The Gesellschaft für Erdkunde und Kolonialwesen in Strassburg presented a memorial to the members in the form of its *Mitteilungen* for 1913. It contained four papers as follows:

1. The origin of the middle-Rhine Valley and middle-Rhine Mountains—Dr. L. van Werveke. 2. Orographic-geologic and tectonic review of the vicinity between Rimbach and Lebertal—Dr. Hans Klähn. 3. The Colony, German New Guinea at present—Dr. Karl Sapper. 4. The development of the Cartography of Alsace, from its beginning to the Cassinian map—Karl Schott.

There were three one-day and three two-day excursions to various parts of the Vosges and to Lorraine, besides half-day excursions to more local points. They were all very well attended. These excursions occurred on the last two days, thereby avoiding conflict with the reading of the papers.

The city of Strassburg showed its generosity, as well as its desire that the geographers be well entertained, by presenting a most attractive and delightful song playlet, (Goethe's) "Die Fischerin." This was given upon a lagoon in the Orangerie. Upon another evening a military band played in the large square (Kleber Platz) in front of hotel headquarters.

The registered attendance was 356 which measures well up to that at previous meetings. American Geographers, particularly those who took part in the Trans-Continental Excursion of 1912, may be interested in reading the names of some of those who attended the congress: Oberhummer (Vienna), von Zahn (Jena), Nussbaum (Bern), Drygalski (Munich), Uhlig (Tübingen); further there were Friederichson (Greifswald), Hahn (Königsberg), Hassert (Cöln), Koch-Grünberg (Freiburg), Mecking (Kiel), Meinardus (Münster), Philippson (Bonn), Sapper (Strassburg).

It was decided to hold the twentieth meeting in Leipzig in 1916.

Map Exhibition Illustrating Economic Geography. A feature of the Eighth Italian Geographical Congress, held at Bari, Italy, in September, is an exhibition of economic maps from the leading countries, giving a comprehensive, cartographic view of their agriculture, industries and communications. The agricultural division is shown in nine sections, including botanical, meteorological, irrigation, crop, and stock-raising maps and maps of agrarian zones, agricultural industries, etc. The division of industries includes geologico-mining maps, maps of fisheries, maps showing the distribution of each manufacturing industry, industrial districts and zones, distribution of motive power and of working population, etc. The division of communications is shown in twelve sections, including maps of maritime, river and rail transportation, plans of ports and maps of their hinterland, postal, telegraph, and colonization maps, etc. Special attention is given to educational maps and texts on the subject.

The International Congress of Ethnology and Ethnography. This Congress, held at Neuchâtel, Switzerland, in June, anouncement of which was made in the March *Bulletin* (p. 207), brought several papers of geographical interest. Dr. Edward Hahn, whose suggestive work "Die Haustiere und ihre Beziehungen zur Wirtschaft des Menschen" (Leipzig, 1896) is well known and whose recent paper in the *Geographische Zeitschrift* (1913, Nos. 6 and 7) on the relation of nomads to their domestic animals again recalls what fruitful fields of inquiry this relatively unworked phase of geography presents, read a paper on "The Date of the Introduction of Plow Culture into Central Europe." M. Henri Froidevaux, the librarian of the Paris Geographical Society, whose "Paris Letters" in the *Bulletin* for 1900 to 1904, will be remembered, spoke on the travels in northern India of Lars de Lauriston, a forgotten explorer-adventurer of the eighteenth century, whose accounts contain valuable

material for the study of the natives, as they had not yet, at the time of his travels, come into frequent contact with Europeans. Dr. Charles Biermann, professor of geography at the University of Lausanne, presented a paper on "Geographical Environment and Race Traits" in which the geographer's consideration of environment was urged upon the ethnologist in his investigations. Dr. Karl Weule, professor of ethnology at the University of Leipzig, submitted a resolution to the congress to the effect that ethnology be recognized as a distinct science and not as a subdivision of geography. This resolution was adopted and transmitted to the nineteenth biennial congress of German geographers, whose sessions were then being held at Strassburg (*Gazette de Lausanne*, June 14, 1914).

Reform of Geographical Teaching in Hungarian High Schools.* In accordance with the general wish to reform secondary school education, Béla de Jankovich, Ph.D., Secretary of the Board of Education in Budapest, has worked out a revised syllabus, which has aroused much interest in educational circles. The chief aims are to reform the teaching of geography and introduce the study into the higher grades of the eight classes of the high schools. Heretofore, geography has been taught only in three classes of the classical, and four classes of the general high schools. The method of teaching is merely descriptive with no attention to the modern, scientific, explanatory side of the study. The Secretary of the Board of Education urges that geography should be taught more fully and in more classes; and, in the higher classes, from a scientific point of view.

The method and matter to be taught is to be considered by the Reform Committees of the Hungarian Geographical Society and the General High School Teachers' Association. These committees hope to secure the introduction of geography into nearly all the classes of our High Schools.

MICHAEL HALTENBERGER, PH.D.

POLAR

ARCTIC

Going to the Relief of the Karluk's Crew. The newspapers printed a despatch from Nome, Alaska, dated July 23, saying that the revenue cutter *Bear*, with Captain Robert A. Bartlett, commander of the wrecked ship *Karluk* of the Stefansson Arctic expedition, on board, sailed on that day to rescue the crew of the lost vessel, at Wrangell Island, where Bartlett and his party took refuge after the sinking of their vessel.† Captain Bartlett was reported as saying that though the Karluk's crew would probably consume all the food they had landed on Wrangell Island by the middle of August, they should be able to subsist on the game with which the island abounds, till relief reaches them. The *Bear* carried provisions for nine months.

Another Large Meteorite Found at Melville Bay, Greenland. A letter received by President Osborn of the American Museum of Natural History, from Professor D. B. Böggild, Director of the Mineralogical Museum of the University of Copenhagen, says in part:

"Mr. Knud Rasmussen has found a large meteorite at Melville Bay, a small specimen of which he has brought home to the Mineralogical Museum of the University of Copenhagen, at whose disposal he has, at the same time, placed the large stone at present lying on the spot where it was found—a gift for which we are exceedingly grateful.

"The Crocker Land Expedition has kindly rendered Mr. Rasmussen scientific help, in this matter, by having the stone examined, after the find was made, both on the spot and in the laboratory; an examination which, through the

* Corresponding to classes 5–8 of the American grammar school and including the American high school.

† See *Bulletin*, Vol. 46, 1914, pp. 530–533.

kindness of Mr. Donald MacMillan, was carried out in a most excellent manner by Mr. W. Elmer Ekblaw, the Geologist of the Expedition.

"Mr. Ekblaw investigated the facts and submitted a very complete report which is of the greatest importance to us. We are indebted not only to the Expedition at present in Greenland but also to the Direction in America. We therefore feel it our pleasant duty to tender our best thanks to the Committee just as we have already directly thanked both Mr. MacMillan and Mr. Ekblaw."

PERSONAL

Dr. Eugen de Cholnoky, professor of Geography at the University of Kolozsvár, Hungary, was, in March, elected president of the Royal Hungarian Geographical Society, Budapest, for the term expiring in 1917. The former President, Professor Louis de Lóczy, Director of the Royal Hungarian Geological Survey and the well-known China explorer, became Honorary President.

Professor W. M. Davis wrote from Sydney, N.S.W., on June 11, that he had arrived there on the 9th, was enjoying the friendly attentions extended to him and was to sail on the next day for New Caledonia, where he was to spend the remainder of the month. He expected to be in New Hebrides in July and to return to Australia in August for the meeting of the British Association. His health had been excellent throughout his long journey and work was never more profitable.

Commander Evans, R.N., addressed the Hungarian Geographical Society, at Budapest, on Feb. 5, on "The Last Expedition of Captain Scott." After the address, Prof. Lóczy, President of the Society, presented to him the Society's gold medal. The meeting was followed by a dinner attended by many well-known people.

Dr. J. Walter Fewkes, Ethnologist of the Bureau of Ethnology, returned to Washington, late in July, from the Mimbres Valley, New Mexico, where he spent six weeks. He brought back a fine collection from that little known region.

Dr. Roland M. Harper, of the Florida State Geological Survey, is making a quantitative analysis of the vegetation of the northern half of the State, by natural divisions (about twenty in number). When the percentages are figured out, it will be possible to determine the proportion of evergreens, grasses, leguminous plants, etc., in each region, correlate them with soil, climate, etc., and draw some interesting conclusions. Beside the vegetation, Dr. Harper will discuss other geographical features, somewhat as he did in his report on the forests of Alabama last year (*Geol. Surv. Ala., Monograph 8*), but more fully if possible.

OBITUARY

Jacob Huber. Dr. Jacob Huber, Director of the Museu Goeldi (Museum of Natural History and Ethnography, Belem, Para, Brazil), died on Feb. 18, in the forty-sixth year of his age.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

THE AMERICAS

The Two Americas. By General Rafael Reyes. Translated from the Spanish, with added notes by L. Grahame. xxxii and 324 pp. Ills. F. A. Stokes Co., New York, 1914. $2.50. 9 x 6½.

This English translation of the Spanish account of the impressions of ex-President Rafael Reyes, of Colombia, during his recent tour of Spain, France, the United States, and South America, is chiefly interesting as giving a view of South America as seen by Latin-American eyes. A noteworthy feature of this record is the account of the geographical exploration of the Putumayo and other affluents of the Amazon, undertaken by President Reyes in his youth with his two brothers and continued for ten years. They navigated these tributaries of the Amazon and the Amazon itself to Brazil, returning to Colombia by steamboat along the same route. One of the brothers died of fever during this work and the other was slain by the cannibal natives of the Putumayo District, recently made notorious by the rubber atrocities. Other salient features are the Colombian version of the conduct of our country in acquiring the Panama Canal Zone, the denial of Bryce's statement that people of Negro blood predominate in Brazil, an extended account of the topography, history, culture, commerce and finance of Argentina, and the full text of the will of Bolivar. DAVID H. BUEL.

Süd- und Mittel-Amerika. Seine Bedeutung für Wirtschaft und Handel. Ein Ratgeber für Exporteure, Importeure, Ansiedler, Minen-Interessenten, Kapitalisten, usw. Von O. Preusse-Sperber. vi and 218 pp. Ills. Otto Salle, Berlin, 1913. Mk. 4. 8 x 5½.

Substantially directions for German emigrants. If you cannot get along at home, are neither too young, nor too old, nor too delicately brought up, emigrate, but *not to the United States*, where the land is too dear and worn out—200,000 farmers left it last year for Canada—and laws or lack of them would bother you, for in 1912 a man got ten lashes and a year's imprisonment in Wilmington, Del., for stealing a revolver! Moreover the immigration authorities would very likely not let you in, although perfectly well. Don't add your powers to Germany's commercial enemy, but go to South or Central America, pretty nearly an Eldorado, where you will not be asked to naturalize yourself, but may remain a German citizen, may raise raw products for Germany and import products of German factories and increase the glory of your Fatherland. But hurry, for what "Washington officially calls Dollar Diplomacy" is after Latin America! MARK JEFFERSON.

The Republics of Central and South America. Their resources, industries, sociology and future. By C. R. Enock. 544 pp. Maps, ills., index. J. M. Dent & Sons, London, 1913. 10s. 6d. 8 x 6.

This study of Latin America from an English viewpoint, differs from the usual works of travel and description dealing with the same subject, in that it aims to look at the Latin American Republics from a demographic standpoint, the economic relation of these peoples to their habitat and the natural resources which surround them. The author is of the opinion that this science of demography, which he terms "human geography" will prove the determining

factor of social equilibrium. The colored maps showing the political divisions, the population, and the economic value of these countries are of material assistance to this view. The more noteworthy chapters are those dealing with the archeological theories in regard to the prehistoric ruins of the Toltecs, and Aztecs in Mexico, and those of the Incas in Peru, the general physical and social condition of Latin America, its foreign relations and commerce, its sociology and future. DAVID H. BUEL.

ASIA

The Madras Presidency, with Mysore, Coorg and the Associated States. By E. Thurston, C.I.E., sometime superintendent of the Madras Govt. Museum. xii and 293 pp. Maps, ills., index. Provincial Geographies of India. University Press, Cambridge; G. P. Putnam's Sons, New York, 1913. $1. 8 x 5½.

This is the first to appear of a series of provincial geographies of India now in preparation. Col. Sir Thomas H. Holland, editor of the series, and author of the chapter on Geology in this volume, says in his preface to the book that among the "provinces" the Madras Presidency has above all developed an individuality of its own; that everyone who knows the Senior Presidency will recognize the pre-eminent fitness of Mr. Thurston to give a true picture of South India; and that no better recommendation of the book can be given than to say that Mr. Thurston is its author. Large attention is given to the peoples, physical geography, resources and industries of the southern part of the peninsula.

The Life and Thought of Japan. By Okakura-Yoshisaburo. viii and 150 pp. Ills., index. J. M. Dent & Sons, Ltd., London, 1913. 3s. 6d. 7½ x 5½.

The author of these seven essays, originally delivered at the Boston Athenaeum, certainly knows what he is writing about. It is a very pleasant picture of the old Japan growing into something new and at present trying to be somewhat less amorphous than the incidence of new culture necessitates. But has he succeeded in translating the thought of Japan into American thought as successfully as he has translated it into English speech? We recall the time when Japanese art was coming to us as a new discovery, very cheap in its medium, for we best knew it in daintily pictorial fans of fuzzy paper on fingers of split bamboo; but what was their appeal to our art sense? We lacked the basic principle wherewith to understand such drawing. So with this graver matter of becoming acquainted with a great community we still feel the lack of comprehension. These essays are very interesting, they will lead us some steps forward toward appreciation. But it is very hard for one culture group to come into sympathy with another culture group, and this regardless of the absolute value of the culture attainments of each. The author strives to make us feel in every one of these essays, he strives to tell those things which shall reveal to us the feeling of his countrymen in their joy of living to unregretted death; but we may not avoid the feeling that he is working in an intractable medium, that the canons of his life are yet unfamiliar to our interpretation of the duties and pleasures of such life as we know. It is saddening to find ourselves deaf to hear and unresponsive to such brilliant effort to reach our comprehension. WILLIAM CHURCHILL.

China's Revolution, 1911–1912. A Historical and Political Record of the Civil War. By Edwin J. Dingle. 303 pp. Maps, ills., index. McBride, Nast & Co., New York, 1912. $3.50, postage 20 cents.

It is yet too early to deal satisfactorily with the political elements of the ill understood complex of upheaval which has been designated the revolution in China, or the revolution of China, according as the student may prefer to interpret facts. No political movement may properly be discussed while yet the events are new. Still less is it possible to arrive at a just comprehension of Chinese politics save by rare intuition into thought methods which are

wholly diverse from those with which we are familiar. But omitting from this work all the politics as debatable, enough remains to make it of great value. Mr. Dingle knows his China well, in some regards, intimately. He has a shrewd knowledge of most of the greater figures who have come to the front in the new China and characterizes them cleverly. The difficulties he has recognized, he knew the uncertainty of rumor, the selfish interest which sought to distort the events of the busy time. Even of occurrences of which he was an eye witness he is forced to acknowledge that the interpretation is doubtful. Still the volume gives us the first clear narrative of what happened to change the empire. We have the record of dates and places of those eventful months, we obtain a glimpse of the interrelation of the commotion within the Forbidden City and the emptying of the Dragon Throne with uprisings in distant provincial centers. Knowing well the chance of error and the certainty of mendacity, he exercised great care in confirming each item of the record. Everything has been supported by the best evidence forthcoming and the proclamations and more official acts, such as the edict of abdication, are translated at length; these will prove of great advantage to the student of the history of that troublous time. WILLIAM CHURCHILL.

AUSTRALASIA AND OCEANIA

Across Australia. By B. Spencer and F. J. Gillen. Vol. 1: 254 pp. Vol. 2: pp. 255-515. Maps, ills., index. The Macmillan Co., New York, 1912. £1 1s., 2 vols. 8½ x 5½.

In these two volumes we have the day by day record of the exploration which has already found fruit in two great works. It is astounding that in the dreary traverse of the central Australian desert they should have found so much, for the miles stretch on without food and water and the only path is the hundred foot clearing through which is strung the overland telegraph from Port Augusta to Port Darwin. With hesitation they introduce a theme worthy of more courageous presentation. This is that the aboriginals of Australia are contemporaneous men of the Stone Age, palaeolithic men just beginning the advance upon neolithic culture as shown by the fact that they employ chipped and flaked stone artifacts with a few in which the stone is polished. I have already advanced the value of this recognition in the case of the neolithic man of the South Sea. Its great importance lies in the light which it may properly cast upon the culture of other men of the Stone Age whom we know only through their remains in cave and lacustrine deposits. The stone bearing the mark of human art is the only permanent memorial and from the specimen unearthed to our view we struggle to reconstruct a society. Spencer and Gillen here suggest that the chipped quartzite and the rubbed diorite are better illustration of Stone Age culture when we find them in Australian hands and have the opportunity to see how they are worked and how employed. Furthermore, our museum specimens can give us a picture of stone life and stone alone, but the Australian gives us to see how, with the stone, man had acquired the use of wood and fur and down of birds and cords of human hair to serve his daily needs and these, being perishable, have vanished from our knowledge of other Stone Age man. When we notice that the primitives of this Australian horizon have not advanced beyond two-ply twine, that pottery, braiding and weaving lie wholly outside their culture, we shall recognize what an opportunity they afford for an insight into the beginnings of other human societies so remote that we are not yet agreed as to their eoliths, whether they fall within the province of ethnology or of palaeontology. WILLIAM CHURCHILL.

The New World of the South. The Romance of Australian History. By W. H. Fitchett. viii and 428 pp. Index. C. Scribner's Sons, New York, 1913. 7½ x 5.

In the first volume of this work the author described those sea adventures, so charged with dramatic interest, that were associated with the discovery of Australia. The present volume tells of the gold discoveries, the bushrangers,

the early explorations, growth of political institutions and the birth of the Australian Commonwealth. One of the best chapters tells of the great work of Leichhardt and of the mystery of his last exploring expedition which was lost in the desert, in 1848.

Corallogene Phosphat-Inseln Austral-Oceaniens und ihre Produkte. Bearbeitet von Carl Elschner. 120 pp. Maps, ills. Max Schmidt, Lübeck, 1913. Mk. 8.75. 10 x 7.

The principal interest of this highly important monograph is that it presents a study of the phosphates of the Pacific islands carefully elaborated for the information of the agricultural chemist and with such discussion of the recent geology of these deposits as may serve as a guide for commercial exploration. Half of the volume is occupied with a study of Nauru and Paanapa, the two richest deposits now commercially exploited. We have very scant information as to these islands and this is a welcome addition. Pursuing his phosphate theme the author presents briefer records of Angaur in the Palau Group, of Makatea in the Tuamotu. He has fallen into a linguistic error when he defines Makatea as signifying "white eye" through misreading *maka* as *mata* eye; *maka* is a good Polynesian word for stone and Makatea really means "white rock," recognizable as a good descriptive name by those of us who have seen the sun light up its white cliffs. These are all islands of upheaval and the phosphate is more or less advanced in the chemical and pressure changes which make the beds a theme of geological inquiry. The islands of recent phosphate formation, to which he devotes a chapter, are the guano islands. Since the book is devoid of an index or even a table of contents it will not be amiss to present a list of these islands: Baker, Howland, Phœnix Group, Sydney, Malden, Starbuck, Christmas, Fanning, Flint, Jarvis, Browse, Lacepède, Laysan, Cornwallis, and Clipperton. Nauru is abundantly illustrated with excellent half tone plates and a well executed map contoured in tint.

WILLIAM CHURCHILL.

EUROPE

The Northmen in Britain. By E. Hull. 256 pp. Ills., index. T. Y. Crowell Co., New York, 1914 (?) $1.50. 8½ x 6½.

A good, popular account of the two great streams of northern invasion, Norse and Danish, which met and battled in the ninth, tenth and eleventh centuries, on the shores of Great Britain and Ireland where both nations took deep root, built cities and absorbed much of the commerce of the country. Norse sources are chiefly used in the narrative.

Les Pyrénées Méditerranéennes. Étude de Géographie Biologique. Par Maxmilien Sorre. 508 pp. Map. A. Colin, Paris, 1913. Fr. 12. 10 x 6½.

By the term Mediterranean Pyrenees the author designates the extreme eastern part of the Pyrenees, including the lower hills and plains on the eastern and northern slopes. The northern boundary corresponds to the, formerly political, but now only linguistic, boundary between Languedoc and Catalonia; the southern boundary is a climatic one: it is identical with that of the moist regions characterized by the deciduous forests. Although composed of a number of individual natural regions bearing very ancient names, the country as a whole may be designated as the region where Mediterranean and Pyrenean influences meet and blend. The biological purpose of the book is the description of those species which determine the individual geographical character of the country. After a study of the landscape as a whole, the different types of climate and vegetation are examined, and then the forms of life are compared with these natural conditions in order to ascertain the correlation and interdependence between them. The types of human life are also studied in their relation to the same conditions.

The combined influence of altitude and distance from the sea have pro-

duced several zones of vegetation each of which shows a more or less complete development according to the special local conditions. In the lowlands near the Mediterranean, protection against the droughts of the summer is the dominating feature. Irrigation has much altered the natural conditions. Between 700 and 1700 meters of height, rainfall is abundant and regular. As the steepness of the slopes is not always favorable for agriculture, textile industries and mining are combined with it. Still higher up, pastures predominate. In those regions where sheep and cattle raising are almost the only occupation of the people, interesting social conditions have survived, the classical example of such a survival being described in the small community of Andorra. The description alone of this little known country would repay one for the study of the book. The author further describes the changes which modern economic conditions and methods are working in the original character of the country, and places especial emphasis on the necessity that the "biological equilibrium" must be maintained between mountains and plains if the country is to experience a healthy development, and that development must be in harmony with geographical character. The book is well illustrated with many pictures and diagrams, and a colored map.

M. K. GENTHE.

Sprachgeographische Untersuchungen über den östlichen Teil des katalanisch-languedokischen Grenzgebietes. Von Dr. Karl Salow. 307 pp. Maps. *Mitt. und Abhandl. aus dem Gebiet der roman. Philol., Seminar für roman. Sprachen und Kultur.* Beiheft 7, Jahrb. Hamburg. Wiss. Anstalten, Vol. 29, 1911. 1912. Mk. 20. 9 x 6½

The first part of the book contains philological matter; the second part, based on the special investigations of the first, attempts the solution of the problem why the linguistic boundary between French (Languedocian) and Spanish (Catalan) does not follow the Pyrenees but runs north of them, along the southern ranges of the Courbières Mts. The explanations offered are both geographical and historical. Geographically the Courbières are a rocky range poorly watered and scantily populated, and they probably stopped the progress of the Franks toward the Pyrenees. On the other hand, refugees from Spain, during the Moorish conquest, crossed the Pyrenees to seek protection in the country north of them (and may have been prevented in their turn from proceeding farther northward by the Courbières). As this hypothesis does not seem sufficiently proven to the author, he places greater emphasis on the historical causes for which he disposes of better documentary evidence. Namely, that the province of Roussillon, which corresponds approximately to the territory in question, has always been a political unit by itself. Its original inhabitants, of pre-Celtic stock, held their own so successfully during the Celtic conquest that their country struck the Romans as a province not belonging to Gaul, and they made a separate *colonia* of it. During the sixth century, the former *colonia* became a diocese by itself, and the boundaries both of the *colonia* and of the diocese correspond almost exactly to the linguistic boundary. Admitting the importance which political lines of demarcation may have in the development of languages, the geographer will notwithstanding emphasize the fact that even the Celtic occupation stopped at that mountain range, and ask the question why northern influences never succeeded in asserting themselves farther south—a question which the purely historical explanation leaves unanswered.

M. K. GENTHE.

Die Niederelbe. Von Richard Linde. 4. Auflage. Land & Leute Monographien zur Erdkunde, Nr. 28. 202 pp. Maps, ills. Velhagen & Klasing, Leipzig, 1913. Mk. 4. 10 x 7.

This is an intensive study of the flood plain of the tidewater Elbe, which consists of the following belts: river, overflowed land, levee, marsh, moor, dune, and the margin of the upland *geest*. These parallel topographic belts are further diversified by transverse soil zones of marine sands, brackish water clays, and true river alluvium. The reaction of these physical features upon the life of the people constitutes the major theme.

Walled in by their dikes, the dwellers of the marsh districts have lived in marked isolation from each other and the world, with "cantonal disunion" as a result. Each little strip of marsh styles itself a "land," and is characterized by distinctive traits and institutions. The particularism is heightened by the Elbe, which has always acted as a barrier between the two sides of its flood plain.

The greatest problem of the people has been the control of the water, both river and underground. Out of the "age-long war with the never-resting foe" the dike communities have emerged as victors. In this contest has been moulded the character of the marsh farmer, distinguished by doggedness, hard sense, and independence. In these lowlands has been developed the haughtiest breed of German *bauern*, who still carry coats of arms like noblemen.

The latter part of the book considers the causes which are responsible for the great expansion of Hamburg, and those which so long retarded its growth.

On the whole the author analyzes the geographical control of racial traits and social institutions, rather than of economic activities. In this delicate task he has succeeded remarkably well. He knows his region intimately, and writes of it feelingly. He has kept a clear eye and a warm heart at his task. The work has been decorated with the Great Medal of Honor by the High Senate of Hamburg. C. O. SAUER.

Hungary's Fight for National Existence, or the History of the Great Uprising Led by Francis Rakoczi II. By Ladislas Baron Hengelmüller. xx and 342 pp. Map, index. The Macmillan Co., New York, 1913. $3.25. 9 x 6.

With the promise that in a later volume he will complete his history, the Ambassador of the Empire-Kingdom discusses one of the critical episodes in the life of the Hungarian nation. Any one who has ever felt stirred by Magyar enthusiasm and the passionate sentiment of proud nationality when the bands strike up the Rakoczi March may well feel curious to discover why so little information is available for the satisfaction of a natural desire to know something about Francis Rakoczi. They form but a small group, these national heroes; we cannot afford to be ignorant of any who have attained these laurels. This is the first work in English by means of which we could make the acquaintance of Rakoczi. Baron Hengelmüller has had access to many documents recently brought to light and has drawn therefrom a clear narrative of the Magyar struggle for national integrity down to the breaking off of the peace negotiations in 1706.

Handbook of Baltic and White Sea Loading Ports, including Denmark. Revised edit. By J. F. Myhre. 576 pp. Maps. W. Rider & Son, London, 1913. 21s. 9½ x 6½.

Covers all Baltic ports. The descriptive text is illustrated by black and white maps giving cartographic data as to harbors and coast contours.

Finlande et Finlandais. Ouvrage publié sous la direction de Werner Söderhjelm. Par E. Hornborg, E. Järnström and others. 330 pp. A. Colin, Paris, 1913. Fr. 3.50. 7½ x 5.

The unpretentious volume is supposed, as Prof. Söderhjelm modestly puts it, to give the reader "a few general notions on the different aspects of life in Finland," to serve as a means of orientation, as it were, for those interested in the recent political changes to which the country has been subjected, and to create a desire for a more thorough study of the country. To obtain this end, the efforts of a number of authors, each an authority on his subject, have been combined to write on the following topics: Geography, ethnology, history, and the parliamentary system, are described by E. Hornberg; intellectual culture and public schools, by E. Järnström; Finnish art, especially in comparison with French art, by A. Hartman; Finnish music, with a special appreciation of Jean Sibelius, by O. Andersson; Feminism in Finland, by Emma Saltzmann; Sports and hygiene, by E. Lampén; the industrial development, by

G.-R. Snellmann; Agriculture in Finland, by G. Grotenfelt. Although the book does not claim to be a scientific book in the narrower acceptance of the word, its spirit is more scientific than that of many a high-toned publication, owing to the perfect honesty and trustworthiness which characterizes every page; and there is not the slightest doubt that it will amply fulfill the above-mentioned purpose for which it was written. M. K. GENTHE.

L'Albania. Di V. Mantegazza. 276 pp. Maps, ills. Bontempelli & Invernizzi, Rome, 1912. L. 3.50. 7½ x 5.

The Albanians are described far more extensively than their country. Their known history is recalled and the race portrayed as energetic, though quite primitive. The writer appears impressed by the courage and deep-seated religious feeling of the people. He fails to call attention to the influence of the region's rugged topography, to which the isolation of the race and the character of its individuals are due. It is plain that he treads on surer ground when dealing with the international problems centering around Albania. His views, however, smack of decided partiality to Italian interpretations of the Albanian question.

A History of Greece to the Death of Alexander the Great. By J. B. Bury. xxv and 909 pp. Maps, ills., index. The Macmillan Co., New York, 1913. $2. 7½ x 5½.

The introductory chapter gives a good though brief summary of the geography of Greece. Seven maps serve well the purposes of cartographical illustration. In this second edition of Dr. Bury's History the larger part of Chapter 1 has been rewritten to conform with the recent discoveries made through the excavations of Sir Arthur Evans and other explorers. This compact, authoritative work may well be read in connection with some of the more recent writings on the physical geography of Greece by such men as A. Philippson, C. Neumann and J. Partsch.

Zustand der Atmosphäre über Europa am 6. Januar 1910. Heft 1, Synoptische Darstellungen atmosphärischer Zustände, Jahrgang, 1910; 1. Serie *Veröffentl. Geophysikal. Inst. der Univ. Leipzig*, herausgegeben von dessen Direktor V. Bjerknes. 13 map plates. 22 x 16.

The importance of the step recently taken by the University of Leipzig in calling Professor Bjerknes to a new meteorological professorship in that institution may be recognized in the prompt appearance of the first series of large synoptic charts showing the pressure distribution and air movement over Europe on the first international "term-day" of 1910. This publication is in many ways an epoch-making one for aerology and for meteorology. It is the first of a series which is to be continued in connection with the international exploration of the free air in Europe. The need of this cartographic presentation of upper air conditions has been felt ever since "sounding the ocean of air" became a serious scientific undertaking; and under the extraordinarily able direction of Professor Bjerknes, the Geophysical Institute of the University of Leipzig will, without doubt, be able to make aerological studies of the greatest value, whose practical bearings upon weather forecasting we shall in due time come to realize.

Ten charts show, for Jan. 6, 1910, the "topography" of the ten "Hauptschichten," *i. e.*, the altitude, for fifty meter intervals, of the isobaric surfaces for every 100 millibars, or for pressures of 750, 675, 600, 525, 450, 375, 300, 225, 150 and 75 mms. of pressure. There are further shown on each chart the thickness of the atmospheric stratum, for ten meter intervals, up to the next higher pressure surface. A new point about these charts is that they show the altitude of the isobaric surfaces, and not, as has been customary, the pressure distribution at definite altitudes. One reason for this change is that it greatly facilitates the numerical computations. In addition to the ten maps just referred to, the isobars and isotherms at sea level, and the sea level air

movements ("stream lines" are shown (Charts 1 and 2), as well as the "topography" of the lower level of the stratosphere.

To meteorologists the world over, and especially to all who are interested in the progress of aerology, the publication of this new atlas will mark a turning-point in the history of our knowledge of the atmosphere. The issue of similar charts, for the other international term days, is to be continued as rapidly as is practicable. There will also be published, as occasion demands, a series of discussions of the material which has already been collected and is available for study. R. DEC. WARD.

Europe and the Far East, 1506–1912. By Sir Robert K. Douglas. Revised and corrected with an additional chapter (1904-1912). By J. H. Longford. 487 pp. Map, index. G. P. Putnam's Sons, New York, 1913. $2. 7½ x 5.

For a decade this work has served as a manual of the policies of the eastern coast of Asia. In the course of the decade its accuracy has been challenged, its motive impugned as manifesting bias, but with the appearance of the authority of the University of Cambridge at its back it has become a standard. In this new edition, made necessary by the course of events in China, the moot points remain in their former statement, new disputes are added in the new chapter written by Prof. Longford for the purpose of bringing the work to date. In China he closes his record with the selection of Yuan Shi-kai as president of the republic. In Japan he records the last treaty of alliance with Great Britain and comments on the condition of the British merchants in the island empire with such criticism of the British Foreign Office as seems scarcely fitting in a historical treatise.

POLAR

ARCTIC

Danmark-Ekspeditionen til Grönlands Nordöstkyst 1906-1908 under ledelse af L. Mylius-Erichsen, vol. 1. *Meddelelser om Grönland,* vol 41, 1913. 474 pp. Maps, ills. C. A. Reitzel, Copenhagen. Kr. 12. 11 x 7.

Im Grönlandeis mit Mylius-Erichsen. Die Danmark-Expedition 1906-1908. Von Achton Friis. Translation by Friedrich Stichert. 2nd ed., xviii and 630 pp. Map, ills. Otto Spamer, Leipzig, 1913. Mk. 15. 10 x 7.

These reports are complementary to each other, the first mentioned constituting the official report upon the purposes and the achievements of the expedition, with which are included the shorter scientific reports; the other work is a popular account setting forth the human side of this great undertaking. This story of sympathetic cooperative effort made under trying conditions that developed the best and truest in a peculiarly well chosen body of men, was first published in Danish in 1909 and appeared in the first German edition in 1910.

As Amdrup says in his official account of the expedition, by it "the coping stone was laid on a work, which had engaged the unwearied attention of numerous explorers for centuries," * * "the extensive coastline of Greenland was now known in the whole of its length." The expedition began its work at Cape Bismarck in lat. 70° 1′, the farthest north attained by the Second German Expedition of 1870 under Koldewey and Payer, where winter quarters were established; and when finished, a previously unknown coast had been surveyed from this point to Cape Clarence Wyckoff in latitude 82° 57′, the most easterly point reached by Peary from the West.

After provision depots had been laid down, two great sledging expeditions were undertaken in 1907, the first under the leadership of the Commander, Mylius Erichsen, and including Lieut. Haeg-Hagen as map maker and the

Eskimo, Brönlund; and the second consisting of Lieut. J. P. Koch with the artist Bertelsen and the Greenlander Tobias Gabrielsen. Two additional supporting parties surveyed the southern and more accessible coast sections with their fringe of islands. The two main parties traveled together as far as Independence Bay where they separated, Erichsen going west to survey this great indentation and connect with Peary's positions on Navy Cliff and the shore of Heilprin Land, whereas Lieut. (now Capt.) Koch kept his course northward across the bay to connect with the most easterly point reached by the American explorer at Cape Clarence Wyckoff. The principal facts in the tragic history of the first party have been often told—how after mapping the great inlet which their surveys showed to be closed and hence a fiord, they attempted to return over the inland ice across the great peninsula of the northeast foreland and all perished, Brönlund alone with frozen feet struggling on to the depot where his body was found with Lieut. Hagen's maps and his own diary of the journey (in Greenlandic) to be recovered a year later by the second relief expedition of Koch and Gabrielsen.

Thanks to the devotion of Brönlund, the native Greenlander, the maps and sketches and the main events connected with the first sledging party of the expedition are known, even though all attempts to recover the bodies and the additional records and diaries of Erichsen and Hagen have proved futile (see review, "Lost in the Arctic," by Ejner Mikkelsen, *Bull. Amer. Geog. Soc.*, vol. 45, 1913, p. 862). The maps of Hagen show that the great peninsula separating Danmark Fiord and Independence Bay (Mylius Ericksen Land) is itself deeply bifurcated by a fiord (Hagen Fiord). Upon these manuscript maps of Lieut. Hagen the name "J. P. Koch's Bay" is given to the wide mouth of Independence Fiord, but with characteristic modesty Captain Koch has refused to allow the name to stand, and upon the published maps it appears as Wandels Hav.

Lieut. Koch's party after crossing this bay to Peary Land, arrived at Peary's Cairn on Cape Clarence Wyckoff in latitude 82° 59′, and after removing Peary's records continued northwestward along the coast and reached Cape Bridgman on May 15th. At this point the return was begun, and after many hardships was completed on June 23, after eighty-eight days of absence. It must be accounted one of the most remarkable Arctic sledge journeys over sea ice ever attempted, the distance covered being over 1,200 miles. Koch has since won greater fame by his crossing of Greenland (April 20-July 16, 1913) in company with Dr. Wegener and others.

The rescue expeditions as well as the two main sledging parties all indicate the remarkable efficiency and resourcefulness of the Greenlanders attached to the expedition. The heroic Brönlund was a man of high intelligence and considerable education. His carefully written journal, which gives us all our knowledge of the ill-fated sledging expedition after it separated from Koch's party, could not at first be fully translated by the other Greenlanders of the expedition because its academic style was somewhat beyond the simple outfit in written language which they possessed.

A peculiar interest attaches to this expedition because two competent artists (Friis and Bertelsen) accompanied it and have brought back the first extensive collection of paintings made in such low temperatures, many of which are reproduced in the popular volume. It was found that special methods had to be resorted to to keep the oil colors from freezing in temperatures as low as 40° Fahr.

In addition to Amdrup's narrative report upon the purposes and accomplished results of the expedition, the official report contains the following scientific papers: Hydrographical Observations by Alf. Trolle; Tidal Observations in Danmark Havn by H. A. Ö. Bistrup; Health Conditions, by J. Lindhard; and Mylius-Erichsen's Report on the non-existence of Peary Channel (information brought home by Ejnar Mikkelsen), by G. C. Amdrup.

Trolle's report upon the Hydrographical Observations includes a study of currents based on the movements of bottles which were set adrift from the vessel and in part afterwards recovered at different points along the Norwegian Coast; soundings and determinations of salinity, density and temperature of the water at different depths along the track of the vessel. The

bottles which were recovered indicate that the drift moves southward along but off the Greenland Coast to the latitude of Iceland, where it is deflected eastward and again northward so as to follow the trend of the Norwegian coast. The soundings supplement those made by the Duke of Orleans in the "*Belgica*" in 1905 and reveal a well developed, marginal continental shelf to Greenland with its edge some ten degrees off the coast. Unlike the continental shelves where they are well known, this shelf is marked by strong longitudinal ridges and furrows representing differences of level of as much as 200 meters and also by marked fiords which trench the shelf transversely. Its edge as shown by the soundings drops off in a cliff some 1,300 meters high with a slope of quite remarkable declivity. The reviewer would suggest that the sharpness and extent of the irregularities upon its surface and the precipitous escarpment at the margin of the continental shelf of Greenland is very likely to be ascribed to tectonic movements which are not here, as elsewhere, leveled off and reduced because the permanent pack-ice prevents the agitation of the water at any considerable depth below the surface. Somewhat similar ridges were discovered by the German Antarctic Expedition to exist beneath the pack ice of Posadowsky Bay. The observations upon temperature, density and salinity of the ocean water, form a particularly full series with interesting results too complex and elaborate to be treated within the limits of this review.

WILLIAM HERBERT HOBBS.

MATHEMATICAL GEOGRAPHY AND CARTOGRAPHY

Geodetic Surveying and the Adjustment of Observations (Method of Least Squares). By E. L. Ingram. xx and 389 pp. Ills., index. McGraw-Hill Book Co., New York, 1911. $3. 8½ x 6½.

This book, originally written to meet the author's own class-room requirements, is not intended to be an exhaustive treatise for the professional geodesist, but rather to contain everything desirable for the student or useful to the practicing civil engineer.

The book is divided into two parts, each complete in itself; the first is a discussion of the practice of geodetic work, the second is an explanation of the mathematical theory on which the rules for adjusting observations are based. Rigorous mathematical discussions are frequently omitted in Part I. This is of advantage to the man in the field who wants results ordinarily without going back to his college mathematics. In discussing angular measurements, particular attention is given to the repeating method because of the good results obtainable with it, with the ordinary engineers' transit, the only angle-measuring instrument in the average engineering party.

The text will be found unusually clear and concise. The book, however, is considerably out-of-date with reference to modern field methods in precise leveling and base-line work, especially as to the current practice of the U. S. Coast and Geodetic Survey. An excellent bibliography of books on geodesy and least squares is given on pp. 374-376.

JAMES GORDON SEESE,
Capt., Corps of Engineers, U. S. A.

Military Topography for the Mobile Forces, including Map Reading, Surveying and Sketching. By Capt. C. O. Sherrill. 3d ed. xviii and 353 pp. Maps, ills., index. U. S. Cavalry Assoc., Fort Leavenworth, Kan. $2.50. 8½ x 5½.

This book is the authorized text in military topography used in the various service schools of the regular army and the organized militia. "It has been written with the intention of giving to line officers of the Mobile Land Forces the principles and methods of making and using military maps and sketches necessary for a complete mastery of the military possibilities of ground and maps. * * * The end in view is * * * especially to assist officers in acquiring that trained topographical eye which grasps instantly the possibilities and limitations of the terrain in its influence on the military situation."

The object of Part I: Military Map-Reading, is to give a statement of the

principles and a solution of the problems essential to the accurate and rapid use of maps for military purposes. This section, though complete, is very elementary, many apparently very simple problems being worked out with elaborate arithmetical detail. Particular attention is given to scales and scale problems. A table of words and abbreviations found on German war game and tactical problem maps is given.

Part II: Military Surveying, lays especial stress on the use of the plane table and stadia method, as the best means of acquiring skill in accurately estimating distances, slopes, and elevations. This part is very complete, and, as in Part I, every problem is reduced to its lowest terms to meet the needs of the non-technical reader. The use of the level, transit, etc., and various special military service instruments and their accessories, is explained. The instruments and methods of the drafting room are sufficiently explained to enable the student to turn out a finished map. A chapter is devoted to map reproduction.

Part III: Military Sketching, gives in detail the methods used at the army service schools in rapid military sketching, illustrated by a detailed study of the steps followed in particular sketches. At the end of the book are found stadia tables and logarithms of numbers and trigonometric functions.

JAMES GORDON SEESE,
Capt., Corps of Engineers, U. S. A.

Astronomy. A Popular Handbook. By H. Jacoby. xiii and 435 pp. Ills., index. The Macmillan Co., New York, 1913. $2.50. 9 x 6.

This book is intended both to meet the needs of the general reader and also to serve as a good text-book in high schools and colleges. It is admirably adapted for both purposes. No book on astronomy presents more clearly written and adequate statements as to the present condition of astronomical science or more lucid explanations of the phenomena of the universe. It duly emphasizes also the services which astronomy renders to civilization, being essential, in fact, to the regulation of time, survey operations on the surface of the earth, the making of maps and charts and ocean navigation. Part 1 is free from mathematics but Part 2 contains a series of mathematical notes and explanations. The general reader may thus confine his attention to the non-mathematical part of the book while the student should master the whole volume.

METHODOLOGY AND TEACHING

Cours de Géographie Industrielle. Par Maurice Grigaut. Bibliothèque de l'Enseignement Technique. vi and 319 pp. Maps. H. Dunod et E. Pinat, Paris, 1912. Fr. 4.50. 8 x 5½.

A skeleton book summarizing the commerce of the world. Nearly two-fifths of the volume is devoted to France and its possessions. Fourteen pages summarize the elements of general geography, of which two pages are given to climate. The brevity of treatment is indicated by the description of the westerly wind area in one line. The facts of production and commerce are also presented briefly, but for the most part accurately. The maps are generalized and unsatisfactory. The volume is one to be memorized, and through its use pupils could not be led readily to an understanding of the principles of commercial geography. Even the treatment of the home country is by items, the value of which is questionable. RICHARD ELWOOD DODGE.

Questions and Exercises in Geography. (Based on Heaton's "Scientific Geographies.") By Robert J. Finch. xv and 48, 37, 47, 46, 28, 32, 56 and 25 pp. Ralph, Holland & Co., London, 1913 (?). 2s. 6d. 7½ x 5.

A volume of review questions in geography primarily for the use of those preparing to pass the formal test examinations for which so many English geography texts have been written. The author emphasizes the importance of "intelligence" on the part of pupils, and announces that memory questions

"have been relegated to the limbo of forgotten things." The use of maps and diagrams is urged and the candidates are warned to be concise and avoid any endeavor to use smooth English.

The questions cover almost every conceivable topic in the commercial, physical and political geography of the world, and vary from mere memory tests of products and names, to questions calling for much thought and broad comparisons. Many of the questions call for an itemized knowledge that must be as embarrassing to the examiner as to the student—for instance, "Discuss the importance of Libreville, Luluaburg, Stanleyville, Nyangwe, and Leopoldville." Many of the questions are very suggestive to any teacher, but the purpose of the volume as a whole is so foreign to American needs that it offers little of service in our country. RICHARD E. DODGE.

A Commerial Geography of the World. By Frederick Mort. viii and 392 pp. Maps, index. Oliver & Boyd, Edinburgh, 1913 (?) 2s. 6d. 7½ x 5.

A brief readable volume along modern lines. The introductory summary of the geographical facts underlying commerce is too concise to be clear, but does include some note of economical as well as physical principles. The commodities entering into commerce are treated under the head of mineral, animal and vegetable products. Though the paragraphs devoted to any one product are brief, the choice of material is good, and it is well presented. The larger part of the volume is devoted to regional commercial geography. Here the treatment is more satisfactory because the causal relations are better brought out. Diagrams and usable black-and-white maps add to the attractiveness of the volume. RICHARD E. DODGE.

Preliminary Geography. By E. G. Hodgkison. xvi and 225 pp. Maps, index. University Tutorial Press, London, 1913. 1s. 6d. 7 x 5.

A Comparative Geography of the Six Continents. By E. W. Heaton. 219 pp. Maps, ills. Ralph, Holland & Co., London, 1913. 1s. 9d. 7½ x 5.

An Elementary Historical Geography of the British Isles. By M. S. Elliott. x and 172 pp. Maps, ills., index. A. & C. Black, London, 1913. 1s. 6d. 7 x 5.

The Atlas Geographies. Preparatory: British Isles. By T. Franklin and E. D. Griffiths. 33 pp. Maps. Europe. 64 pp. Maps. 6d. each.

Visual Geography. A Practical Pictorial Method of Teaching Introductory Geography. By Agnes Nightingale. Book 2: Continents and Countries. 48 pp. Maps. A. & C. Black, London, 1913. 8d. 9 x 7.

New Era School Atlas. 40 map plates. 6d.

The Scholars Geographical Exercise Book. The British Empire. 16 plates. 2d. W. & A. K. Johnston, Ltd., Edinburgh, 1913. 9½ x 7½. ½d. each.

Taken as a whole, three of these eight small books may be said to contribute something substantial to the field of school geography. Our English friends are turning out little books in geography rapidly, but many of them are simply brief compilations, and the general level of school geography is not advanced by their publication. Frequently the author says that his book covers sufficient ground to meet this or that examination. It is a principle, with few exceptions, that a book written chiefly to fit pupils for some examination has few other merits.

Mr. Hodgkison's "Preliminary Geography" attempts to cover the entire world in 200 small pages. Outside of the chapters dealing with the British Empire, a pupil might almost as well have no geography at all as to have

this dry recital of the barest facts, by no means accurate. See for example the absurd railroad map of the United States with the Central and Union Pacific Railroad reaching to Washington, Philadelphia, and New York. We are also told that Pittsburgh is connected with Lake Erie by a canal.

Heaton's "Comparative Geography of the Six Continents," announces in the preface that it covers World Geography on the scale required for the Junior Local Examinations. The author attempts a causal treatment but seems to feel that he must not make a book that can not be carried in the inside coat pocket and so squeezes all the life out of it and gives us another catalogue of facts, dry, vague, and deadly to any growth of interest in geography.

Elliott's "Elementary Historical Geography of the British Isles" has merit. It does not attempt the impossible; in its 160 pages, it can give and does give enough concrete details to awaken interest. If there is a place for such a book in English schools, this little volume will give English school children some ideas that will stick.

"The Atlas Geographies" have the merit of good physical maps, and of map exercises which form an integral part of the books. Too many places, rivers, etc., are mentioned so that the really important ones may be lost in the multitude. The colored maps are all physical. The only political map of Europe in the book on Europe, is a half-page black and white map. To most persons, the political divisions of Europe are matters of primary interest. On the whole, the Atlas Geographies seem to an American much better than the coat-pocket type of book.

Miss Nightingale's "Visual Geography" is an odd little exercise book for beginners. Its exercises are of the kindergarten busy-work kind, but they are sure to interest little people and to attract them to the study of geography.

"The New Era School Atlas," containing 40 good maps both physical and political, and selling for six pence, is a credit to W. & A. K. Johnston. The physical maps are pleasing in appearance and effective. They reflect German influence.

"The Scholar's Geographical Exercise Book" consists of 16 good outline maps, bound in strong manila covers and selling for the small price of 2 pence.

R. H. WHITBECK.

GENERAL

Islam, Mission, Politik. Von Martin Hartmann. xvii and 162 pp. O. Wigand, Leipzig, 1912. Mk. 3.60. 8 x 5½.

This slight volume is a most energetic discussion of a theme which is engaging the attention of many cultural pioneers. The missionaries of the Christain faith find themselves in rivalry for the amelioration of many races of the primitive types of humanity. Administrators of provinces and protectorates have to deal with the same situation. This is all due to the fact that the faith of Mohammed proves almost immediately acceptable to society of the rudest type and to that extent excites an upward step. Clerical conferences have recently been seriously engaged with the problem which Islam presents and plan a vigorous effort to bring the followers of the Prophet back to the fold. Hartmann has been charged with considering the theme from a line of approach that is too radical. He argues wholly along the line of cultural development and of uplift in the plane of living. It is an able presentation of that secular aspect of the case and will add to the equipment which must be ours before we can deal intelligently with the problem involved.

WILLIAM CHURCHILL.

Der Tropenartz. Ausführlicher Ratgeber für Europäer in den Tropen sowie für Besitzer von Plantagen und Handelshäusern, Kolonial-Behörden und Missions-Verwaltungen. Von Dr. med. Fr. Hey. 2. völlig umgearbeitete Auflage. xii and 435 pp. Index. Hinstorff'sche Verlagsbuchhandlung, Wismar, 1912. Mk. 7.

The researches of Koch, of the Liverpool School of Tropical Medicine, of

the surgeons of our own army and navy, have all contributed to the extreme worth of this manual. No physican would recommend lay practice. It is only in the last resort that any person of common sense would incur the dual risk of error in diagnosis and mistake in treatment. But the last resort is always the ruling condition in the case of most white persons in the tropics—hunters, planters, missionaries, government servants. Therefore Dr. Hey has rendered the service of a conscientious physician in writing this handbook of self-medication. He deals fully with personal hygiene, he teaches persons of fair intelligence how to mark the symptoms of disease and how to deal with it. It is all written in plain terms and is well within the comprehension of the layman. For each disease he supplies the name of the most successful remedy and directions for its use. In view of our national advance upon tropical possessions we could wish that some medical man with tropical experience would translate this work into English or give us a substitute at the same nominal cost which could be put into the hands of all our missionaries and school teachers who have to cut loose from civilization in the Philippines. Their usefulness toward the lower races would be enhanced and we should hear far less of the very present malady of Phillippinitis.

WILLIAM CHURCHILL.

Universities of the World. By Charles F. Thwing. xv and 284 pp. Ills., index. The Macmillan Co., New York, 1911. $2.25. 8 x 5½.

President Thwing wrote these papers at various times. Twenty institutions from Oxford to Tokyo, and from Upsala to Melbourne, are described and characterized. These summaries are the result of personal observation, except Melbourne, which was not visited. The author has tried to catch the spirit of each institution, and to summarize its work especially from the point of view of its utilization of opportunities. The chapters are written from a broad viewpoint, in appealing style, and with force. They are sketches rather than studies. Incidentally, one gets many glimpses of President Thwing's mature judgment as to the strength and weakness of American education.

RICHARD ELWOOD DODGE.

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These notes do not preclude more extended reference later

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 74 of this volume

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

United States. [Twenty-one base maps of various states, 1:500,000] (1) Alabama. Compiled in 1911 and 1912. (2) Arkansas. Compiled in 1912 and 1913. (3) Delaware. Compiled in 1912. (4) Georgia. Compiled in 1911-12. [No title]. (5) Illinois. Compiled in 1909-10 in cooperation with the State of Illinois: Frank W. DeWolf, State Geologist. (6) Indiana. Compiled in 1909-10. (7) Iowa. Compiled in 1911-12. (8) Maryland. Compiled in 1912 and 1913. (9) Michigan. Compiled in 1910 and 1911. In 2 sheets. (10) Minnesota. Compiled in 1910-11. In 2 sheets. (11) Mississippi. Compiled in 1910-11. (12) Missouri. Compiled in 1914 in cooperation with the State of Missouri: H. A. Buehler, State Geologist. (13) New Jersey. Compiled in 1912. (14) New York. Compiled in 1913. (15) North Carolina. Compiled in 1900 and 1910 in cooperation with the State of North Carolina: Joseph Hyde Pratt, State Geologist. In 2 sheets. (16) Ohio. Compiled in 1910 and 1911.

1 color. (17) Pennsylvania. Compiled in 1910-1911-1912. [No title]. (18) South Carolina. Compiled in 1913. (19) Tennessee. Compiled in 1911 and 1912 in cooperation with the State of Tennessee: A. H. Purdue, State Geologist. (20) Vermont. Compiled in 1910-11. (21) Wisconsin. Compiled in 1910 and 1911. In 2 sheets.—All states compiled under the direction of R. B. Marshall, Chief Geographer, by A. F. Hassan, Cartographer. U. S. Geological Survey, Washington, D. C.

[These are the maps issued to date in the important series of black-and-white state base maps on the scale of 1:500,000 in course of publication by the U. S. Geological Survey. While primarily intended to afford the groundwork for the United States sheets of the International Map of the World (see *Bull.*, Vol. 44, 1912, p. 841), they are invaluable for all the manifold purposes for which a general map of a state is required. The fact that satisfactory general maps of the states are not readily available (the state maps sometimes to be found in the reports of the Federal and state geological surveys or those of the public land states published by the General Land Office have so far been the only ones available,—for the average state maps in general atlases can hardly be termed satisfactory) makes this series especially valuable. The uniform scale is also an advantage. This is only one of many similar general undertakings for which the geographic world is indebted to the U. S. Geological Survey. The promptness with which the maps follows each other—fourteen have been issued in the period from Nov. 1912 to July 1914—is also characteristic of the Survey's methods.

The maps are outline maps only, i. e. they show no relief. The elements shown are drainage, county and, where existing, township boundaries, railroad, steam and electric (these are differentiated), and towns. Where the latter are large enough to be represented to scale, their extent is indicated by the somewhat ungeographic method of shading the whole administrative area, not only the built-up section. A laudable exception is made on recent sheets in the case of New York City and St. Louis. The map of Illinois, which is exhausted in this edition, has been issued, in colors, by the geological survey of that state (for review, see under "Illinois," *Bull.*, Vol. 44, 1912, p. 399), and that of North Carolina, reduced to 1:685,000 and with political coloring of the counties, by the North Carolina Geological and Economic Survey (see under "North Carolina," *Bull.*, Vol. 45, 1913, p. 237). The identity of scale and similarity of treatment of the base of the recent hypsometrical map of Colorado (see under "Colorado: (a)," *Bull.* for April, 1914, p. 315) makes it appropriate to call attention to it in this connection, although, strictly speaking, it does not belong to this series (see *Erratum* in *Bull.* for July, 1914, p. 560). All the maps, except those of Iowa and Vermont, bear the remark "Advance sheets; subject to correction.]

AFRICA

German East Africa. Garnison-Umgebungs-Karte von Massoko. Aufgenommen, konstruiert und gezeichnet von Hauptmann v. Trotha. Reduziert nach den Originalaufnahmen in 1:35,000 v. W. Bobzin auf 1:100,000 im kartogr. Institut v. Dietrich Reimer (Ernst Vohsen), Berlin. 1:100,000. 9°7.4' - 9°38.7' S.; 33°31' - 34°1' E. 6 colors. Accompanies, as Karte 11, "Begleitworte zu der Garnison-Umgebungs-Karte von Massoko 1:100,000" by H. von Trotha, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 26, 1913, No. 4, pp. 344-350.

[Comparatively large-scale survey of the area between the Kiwira and Lufirio Rivers lying immediately northwest of the northern end of Lake Nyassa, between it and the volcano Rungwe. Relief is in generalized contours in brown, forest in pale green, banana plantations in blue-green, drainage in blue, distinction being made in the latter between the navigable and unnavigable stretches of streams. The absence of all absolute elevations is regrettable.]

Kamerun-Togo. Höhenschichtenkarte von Kamerun mit Togo. Bearbeitet von Max Moisel. 1:2,000,000. 13°5' N. - 1°20' S.; 8° - 19° E. 16 colors. With four insets: (1) Togo. Bearbeitet von Paul Springade. 1:2,000,000. 11°10' - 5°40' N.; 0°30' W. - 1°50' E. 10 colors. (2) Der Niger-

Benueweg nach Nord-Adamaua und den deutschen Tschadseeländern. 1:6,000,000. 10° - 3⅓° N.; 5½° - 13° E. 2 colors. (3) Übersichtskarte. 1:25,000,000. 14° N. - 1° S.; 1° W. - 19° E. 2 colors. (4) Der Kongo-Verkehrsweg nach Südost-Kamerun. 1:6,000,000. 0° - 6° S.; 8° - 18° E. 2 colors. Accompanies "Begleitworte zu der Höhenschichtenkarte von Kamerun mit Togo in 1:2,000,000" by M. Moisel, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 26, 1913, No. 4, pp. 339-340.

[Important physical map of Kamerun and Togo, the latter on inset (1). Relief is represented by hypsometrical coloring according to the usual scheme, ranging from greens for the lowlands to browns and reds for the highlands. On the map of Kamerun contours are used for every 250 meters up to 1,000 meters and for every 500 meters beyond that elevation; on the map of Togo the 100 meter contour is shown in addition. Ocean depths are shown in shades of blue, practically the same contour intervals being used as for the relief of the land. The physical coloring is extended to the limits of the map, thus including the adjoining portions of Nigeria, French Equatorial Africa and the whole of Rio Muni. This map is now, in view of its relatively large scale and the completeness of the sources on which it is based, the standard representation of the relief of the regions concerned, superseding the corresponding maps of Kamerun by Passarge, 1:6,000,000, and of Togo, 1:2,500,000, in "Das deutsche Kolonialreich," edited by Hans Meyer.]

AUSTRALASIA AND OCEANIA

Kaiser Wilhelms Land. Route Dr. R. Thurnwald's vom unteren Kaiserin-Augusta-Fluss zur Nordküste von Kaiser-Wilhelmsland. 1:500,000. 3°33′ - 4°20′ S.; 143°28′ - 144°34′ E. Accompanies, on p. 359, "Eine Durchquerung des Gebiets zwischen Kaiserin-Augustafluss und Küste" by [R.] Thurnwald, *Mitt. aus den Deutschen Schutzgebieten*, Vol. 26, 1913, No. 4, pp. 357-363.

[Black-and-white sketch map showing route of ethnologist of the expedition from the Kaiserin Augusta River to the coast.]

Oceania. [Maps of various islands:] (a) Nauru. [1:50,000]. [0°33′ S. and 166°55′ E.]. 4 colors.

(b) [Maps of seven islands:] (1) Flint Island. [1:75,000]. 11°25′ S. and 151°48′ W. (2) Enderbury-Isl., Phönix-Gruppe. [1:75,000]. [3°8′ S. and 171°10′ W.]. (3) Malden-Insel. [1:150,000]. 4° S. and 164°55′ W. (4) Starbuck I. [1:150,000]. 5°37′ S. and 155°56′ W. (5) Jarvis-I. [1:115,000]. 0°22′ S. and 160°0′ W. (6) Browse-Insel. [1:40,000]. 14°4′ S. and 123°3′ E. (7) Lacepede-Inseln. [1:150,000]. 16°50′ S. and 122°10′ W.

(c) Angaur. [1:18,000]. 6°54′ N. and 134°9′ E.

(d) Makatea. [1:20,000]. [15°50′ S. and 148°11′ W.]

Accompany respectively as Taf. IVa, XI, XII and XIII, "Corallogene Phosphat-Inseln Austral-Oceaniens und ihre Produkte" by C. Elschner, Lübeck, 1913.

[All, except map (a), black-and-white maps of islands in the Pacific Ocean containing phosphate or guano deposits. The location of these deposits is generally indicated. Map (a) is evidently based on an original survey, thus superseding the best representation heretofore available, namely, that on British Admiralty chart No. 979, which is reproduced on Taf. IVb of the book. The low coral land is shown in green and the higher dolomitic "pinnacle" land in brown, elevation being indicated in meters.]

EDUCATIONAL

North America. (a) Physical Wall Map Series by J. Paul Goode: North America. Werner's equal area projection. 1:6,167,209 (*sic*). 90° - 1° N.; 180° - 5° W. 13 colors. Rand, McNally & Co., Chicago-New York, 1914.

(b) Political Wall Map Series by J. Paul Goode: North America. Same projection, scale and coordinates as map (a). 7 colors. Rand, McNally & Co., Chicago-New York, 1914.

[To one who is interested in the progress of American cartography every

advance is a matter of satisfaction. When this advance is made by the firm which has unfortunately been known rather for the quantity of its output than for geographical excellence there is added reason for congratulation. The present maps are distinctly a step in the right direction. The physical map particularly is a great improvement on the corresponding map in the same firm's Columbia Series (for review, see under "Educational," *Bull.*, Vol. 43, 1911, pp. 799-800), which the present map is presumably intended to replace. The accepted color range from green to brown has been adopted to express relief, supplemented by hachures in brown. The elevation tints are: below sea level, pale green; 0-1000 ft., green; 1000-2000 ft., yellow; 2000-5000 ft., pale brown; 5000-10,000 ft., brown; over 10,000 ft., brick red. Six depths of the sea are also distinguished, namely, between the isobaths of 0, 500, 5000, 10,000, 15,000, 20,000 ft. The continental shelf (0-500 ft.) is left white while the remaining depths are colored in increasingly dark shades of blue. The July 10°, 20° and 30°C isotherms shown in red, and the January —30°, —20°, —10°, 0°, 10° and 20°C isotherms in blue. Ocean currents are shown, cold in blue, warm in red. All cities of over 100,000 are shown and those above 300,000 and above 1,000,000 are emphasized respectively by an overprinted triangle and circle in red.

While the color scheme is in general satisfactory, the transition from the green of the 0-1000 ft. layer to the bright yellow of the 1000-2000 ft. seems rather more abrupt than the physical configuration of the land would warrant. This contrast is heightened by the fact that no contour has been inserted between 0 and 1000 ft.; and still between these lies the critical 600 ft. contour which broadly divides the lowlands from the highlands the world over. The result is that, for instance, the Appalachians seem to rise abruptly from the lowland with no hint of the Piedmont on the one side and the Appalachian Plateau on the other. The isotherms shown, while including the three critical temperatures of 0°, 10° and 20°C for the warmest and the coldest month, the importance of which has recently been urged by Prof. Herbertson, are not balanced between January and July: the comprehensible inclusion of negative January temperatures to cover the northern part of the continent might well have been paralleled by an extension of the July isotherms beyond 20° to correspondingly cover the southern part. The trace of the January isotherms over Greenland, furthermore, does not make allowance for the temperature conditions created by its ice cap, as we now know them: instead of bending gently southward they should practically hug the coast. On the other hand, the representation of the Arctic regions reveals familiarity with recent exploration: the Northeast Foreland of Greenland, the east coast of Victoria Island, even the northern part of Baffin Island and Southampton Island are represented according to latest knowledge—a fact worthy of comment when it is remembered that even so authoritative a map as the geological map of North America published by the U. S. Geological Survey fails in this respect. The full line used to show Keenan Land might create overconfidence in its existence. In the anthropogeographic domain the sound pedagogic principle of elimination of non-essentials has been adopted—in contrast to the previous edition of the map—in the selection of cities, only the most important being shown.

The political map shows, besides the political units and their subdivisions marginal coloring wisely being used instead of the all-too-frequent areal coloring), the main steamship lines, with distance in nautical miles, ocean cables and railroads, trunk lines and secondary lines being differentiated in the latter. Even so, only the more important lines are shown: indeed, the map affords one of the few available critical representations of the railroad routes of the United States,—a subject which is often unsatisfactorily dealt with by foreign compilers, as in the case of Bartholomew's otherwise excellent physical map of the United States (cf. *Bull.*, Vol. 45, 1913, pp. 155-156).

In general treatment, the maps do not always fulfill the requirements of a wall map. The main requirement is legibility at a distance; this is, of course, not attained simply by drawing a map on a large scale, but by using a bold method of representation. What is shown must be discernible from all parts of a class room. Essentials only should be shown—especially in a school wall map—but these should be clearly discernible. This principle has not been fol-

lowed throughout in the present case. Although the main rivers have been emphasized, many are not visible at a distance, particularly if the surrounding color be unfavorable, as in the case of the upper Yukon and the Tanana. The method employed—two heavy black lines enclosing a white one—is not very felicitous. The position of towns is also not evident at a distance, the emphasis of the symbols for cities of over 300,000 inhabitants by a red overprint indicating a recognition of this fact. On the political map the railroad lines likewise cannot be distinguished; the steamship routes can be made out only because of the contrasting and uniform tint of the water. Adequate treatment of all these elements will be found on modern European school wall maps, such as Gaebler's North America, 1:4,500,000, Diercke's United States, 1:3,000,000, or Unstead and Taylor's recent wall atlas of North America, 1:6,000,000.

The scale is stated to be 97 miles to the inch, or 1:6,167,209. Aside from the irreconcilability of these two statements, the expression of the natural scale in numerals to the nearest unit overlooks the fact that the limitations of printing or the liability of paper to shrinkage makes all such niceties futile.

The importance of the present maps lies in the fact that they are the first American maps of this type to emanate from professional geographical circles. Heretofore we have had to rely either on the compilations by unqualified persons in the office of our map publishing firms, whose aims are chiefly commercial and whose standards are far from scientific, or else on foreign material. The advance of geography in this country will inevitably bring about emancipation from these sources, and it is because the present maps are the forerunners in this movement that they deserve special attention.]

Other Maps Received

NORTH AMERICA

CANADA

Ontario. Gold producing area Porcupine. 2 in. to 1 mi. Hamilton B. Wills, Toronto, Canada, 1913. $1.00.

Quebec. Scarborough's new census map of Quebec. 9 mi. to 1 in. The Scarborough Co., Hamilton, Ont., 1913.

SOUTH AMERICA

Columbia. Der Alto Chocó (Kolumbbien), von Joh. Kunst. 1:810,000. L. Friederichsen & Co., Hamburg, 1913.

AFRICA

Africa. Bathy-orographical map of Africa. 1:8,400,000. W. & A. K. Johnston, Ltd., Edinburgh, [1914].

Algeria. Algérie. 1:200,000. Feuille 12, Téniet-el-Had; 13, Boghari; 14, Bou Saada. Adolpe Jourdan, Alger, [1914]. 1 fr. ea.

British East Africa. East Africa Protectorate. 1:250,000. Sheet South A37/A, Nakuru-Nyeri; North A36/X, Uasin Gisnu; North A36/Q, Elgon. The Surveyor General's Office, Nairobi, B.E.A., 1913.

Portuguese East Africa. Esboço do territorio de Companhia de Moçambique. 1:2,720,000. Companhia de Moçambique, Lisbon, 1911.

Mineral survey map of portion of the territory of the Companhia de Moçambique, Portuguese East Africa. 16 mi. to 1 in. Companhia de Moçambique, Lisbon, 1912.

Union of South Africa. Union of South Africa, Mines Department—Geological Survey. Sheet 2, Pienaars River, portions of Pretoria, Rustenburg and Waterberg Districts. 2.347 mi. to 1 in. Mines Department, Pretoria, 1911.

ASIA

China. Missionskort over Syd-Manchuriet. 1:500,000. Inset: Manchuriet med omliggende egne, 1:3,500,000. Det Danske Missionsselskab, Kjøbenhavn, 1913. Kr. 1, 50 Øre.

India. Bathy-orographical map of India. 1:3,000,000. W. & A. K. Johnston, Ltd., Edinburgh, [1914].

Turkey in Asia. Historical maps of Bible lands, edited by Charles Foster Kent, Ph.D., and Albert Alonzo Madsen, Ph.D. Sheet 1, Period of the Wilderness Wanderings, 1200-1150 B. C., 20 mi. to 1 in.; 2, Period of Hebrew settlement of Canaan, 1150-1050 B. C., 8 mi. to 1 in.; 3, United and divided Hebrew kingdoms, 1050-586 B. C., 8 mi. to 1 in., with insets: Solomon's Temple, 50 ft. to 1 in., Jerusalem before the exile, 900 ft. to 1 in.; 4, The post-exilic period, 538-63 B. C., 8 mi. to 1 in.; 5, Palestine in the time of Jesus, 4 B. C.-30 A. D. (including the period of Herod, 40-4 B. C.), 8 mi. to 1 in., with insets: Herod's Temple, about 150 ft. to 1 in., Jerusalem during the Roman period, 900 ft. to 1 in.; 6, St. Paul's journeys and the early Christian church, 40-100 A. D., about 55 mi. to 1 in.; 7, Assyrian, Babylonian and Persian Empires, 50 mi. to 1 in. Published jointly by the Methodist Book Concern, The Presbyterian Board of Publication, The Congregational Sunday School & Publishing Society, The American Baptist Board of Publication, and the Christian Board of Publication. The Methodist Book Concern, New York, 1912.

AUSTRALASIA AND OCEANIA

Australia. Map of New South Wales Railways, showing coach and other routes from the various stations, together with mileage from Sydney, with diagrams of North Coast, South Coast, and parts of southern and western lines. 29 mi. to 1 in. Department of Lands, [Sydney], N. S. W., 1913.

EUROPE

Austria-Hungary. Przegladowa mapa geologiczna Galicyi, Dra. Tadeusza Wiśniowskiego. 1:1,500,000. Landesregierung für Bosnien und die Hercegovina, Sarajevo, 1908.

Razdioba Konfesija u Bosni i Hercegovina po resultatima popisa ziteljstva godine 1910. 1:800,000. Landesregierung für Bosnien und die Hercegovina, Sarajevo.

Postkurs-Karte von Bosnien und der Herzegovina. Bezirk der k. u. k. Militärpost- und Telegraphen-Direktion in Sarajevo, 1913.

Balkan Peninsula. Flemmings namentreue (idionomatographische) Länderkarten: Blatt 7, Karte der Balkanhalbinsel. 1:1,500,000. Bearbeitet von Otto Herkt. Carl Flemming, Verlag, Berlin, [1913]. M. 3.50.

British Isles. Railway map of the British Isles, by John Bartholomew, F.R.G.S. 19 mi. to 1 in. Insets: London & Suburbs; Enlargement of South Lancashire & Yorkshire District; Enlargement of Edinburgh and Glasgow District; Birmingham and District; Newcastle and District, Swansea and Cardiff District. John Bartholomew & Co., Edinburgh, [1914]. 1/-.

Bacon's plan of the Borough of Blackburn. 6 in. to 1 mi. G. W. Bacon & Co., London, [1913]. 1/-.

Bacon's plan of Exeter and suburbs. 6 in. to 1 mi. G. W. Bacon & Co., London, [1913]. 1/-.

Bacon's new plan of Leeds and suburbs. ¾ in. to 1 mi. G. W. Bacon & Co., London, [1913]. 1/-.

New "Half-inch" cycling road maps of England and Wales—Cambridge District. 2 mi. to 1 in. G. W. Bacon & Co., London, [1913]. 1/-.

New "Half-inch" cycling road maps of England and Wales—Preston District. 2 mi. to 1 in. G. W. Bacon & Co., London, [1913]. 1/-.

New "Half-inch" cycling road maps of England and Wales—North Devon. 2 mi. to 1 in. G. W. Bacon & Co., Ltd., London, [1913]. 1/-.

New "Half-inch" cycling road maps of England and Wales—South Devon. 2 mi. to 1 in. G. W. Bacon & Co., [1913]. 1/-.

Central Europe. Düms' Comptoir- und Reisekarte von Mitteleuropa, nach amtlichen Quellen bearbeitet. 28. Auflage. 1:2,160,000. W. Düms, Wesel, [1913]. 60 Pf.

Neueste Eisenbahnkarte von Mittel-Europa, nach amtlichen Quellen bearbeitet. 1:2,160,000. W. Düms, Wesel, [1913].

France. Flemmings namentreue (idionomatographische) Länderkarten: Blatt 2, Karte von Frankreich. Bearbeitet von Otto Herkt. 1:1,500,000. Insets: Bordeaux, 1:150,000; Paris und Umgebung, 1:500,000; Paris 1:150,000; Corse. Carl Flemming, Verlag, Berlin, [1913].

Germany. C. Kiesler's Reise- u. Eisenbahnkarte von Deutschland und den angrenzenden Ländern zum Gebrauch für das Contor und die Reise. [1:2,200,000.] Verlags-Institut Richard Kühn, Leipzig, 1914. 50 Pfg.

Eulitz' Kreiskarten der Provinz Pommern. 1:100,000. Sheets: Lauenburg, Köslin, Usedom-Wollin. Oscar Eulitz, Verlag, Lissa i. P., 1913. Mk. 0.75 ea.

Wanderkarte für das obere Saaltal und den Frankenwald. 2. Auflage. 1:50,000. Inset: Frankenwald, 1:100,000. Fr. Krüger, Lobenstein, [1913].

Schiläuferkarte der Berchtesgadener Alpen. 1:100,000. Oskar Brunn, München, [1913]. Mk. 1.75.

Skitourenkarte vom Ammergebirge, herausgegeben vom Wintersportsverein Oberammergau. 1:100,000. Oscar Brunn, München, [1913].

Brunn's Spezialkarte der Südöstl. Umgebung Münchens, umfassend das Gebiet nördl. bis Schwaben, östl. Wasserburg a/Inn, südl. die Tegernseer- und Schlierseerberge bis Kufstein. 1:100,000. Oscar Brunn, München, [1914]. 2 Mk.

Schwarzwald Spezialkarte, Blatt II, Renchen, Freudenstadt, Schiltach. 1:75,000. Geogr. Anstalt Kümmerly & Frey, Bern, [1913]. Mk. 2.

Germany-Austria. Brunn's Strassenkarte von Südbayern und Tirol mit den angrenzenden Ländern. 1:800,000. Oskar Brunn, Kartogr. Anstalt, München, [1913]. Mk. 1.20.

The Netherlands. Ten Brink's Groote Kaart van de Provincie Limburg. Ten Dienste van Handel en Verkeer naar officielle bronnen bewerkt door J. de Regt, met alfabetischen klapper en plaatsbepaler 1:150,000. H. Ten Brink, Meppel, [1914].

Norway. Generalkart over det sydlige Norge i 18 Blade. 1:400,000. [Sheets bear various dates up to 1901]. Norges geografiske Opmaaling, Kristiania. Kr. 0.60 ea.

Valkart over Norge, utarbeidet av Johan Ydstie og Arne Blom. Forlagt av Cammermeyers Boghandel, Kristiania, 1913.

Switzerland. Map indicating the special regulations concerning the circulation of auto-cars in Switzerland. 1:500,000. Federal Department of the Interior, Bern, [1913].

Carte officielle des chemins de fer Suisses. 1:250,000. 4 sheets. Service topogr. fédéral, Bern, 1913. Fr. 2.50 each.

Russia. Flemming's namentreue (idionomatographische) Länderkarten: Blatt I, Karte von Russland aus Sohr-Berghaus Handatlas. 1:4,500,000. Bearbeitet von Otto Herkt. Carl Flemming, Verlag, Berlin, [1913].

Westliches Russland mit den deutschen, österreichisch-ungarischen und rumänischen Grenzgebieten. 1:2,000,000. Carl Flemming, Berlin, [1913]. M. 1.

Map of the Gouvernement Poltawa. [In Russian]. 20 versts to 1 inch. A. Ilyin, St. Petersburg, [1913].

WORLD AND LARGER PARTS

Imperial map of the world in hemispheres. Equat. scale 1:22,500,000. Insets: North Pole from 50° N. Latitude; South Pole from 50° S. Latitude; Hemisphere showing greatest amount of land; Hemisphere showing greatest amount of water. W. & A. K. Johnston, Ltd., Edinburgh, 1914.

The world on Mercator's projection. Equat. scale 1:33,500,000. Insets: New Zealand, Tasmania, Cape of Good Hope, Malta, Eastern Canada, India, West Indian Islands, British Guiana, Channel Islands. W. & A. K. Johnston, Edinburgh, [1914].

ATLASES

Calendario-Atlante de Agostini, Anno XI, Serie II, Vol. 1, con notiziario redatto da L. F. de Magistris. [24 plates and index.] Istuto Geografico de Agostini, Novara, 1914. 1 lira. 6 x 3 inches.

Testo-Atlante delle ferrovie e tramvie italiane e di quelle estere in contatto, con un indiceprontuario di tutte le linee stazioni, fermate, scali, ecc., delle ferrovie, tramvie e laghi italiani. 6 diagramme intercalati nel testo e 30 tavole. Istituto Geografico de Agostini, Novara, 1913. Lire 5. 8½ x 5 inches.

L. L. Poates & Co.'s Handy Atlas of the World, containing maps of the United States, its 48 states, territories and insular possessions, Dominion of Canada, each of the provinces and foreign countries. [78 pages of maps and index.] L. L. Poates Publishing Company, New York, 1914. 8 x 6 inches.

Philips' Handy-Volume Atlas of the World, containing seventy-four new and specially engraved plates with statistical notes and complete index. Ninth edition, revised to date. By E. G. Ravenstein, F.R.G.S. George Philip & Son, Ltd., London, 1910. 6 x 4 inches.

Philips' Pictorial Pocket-Atlas and Gazetteer. 148 pages of maps, pictures and statistical diagrams, with gazetteer-index of 18,000 names. George Philip & Son, London, [1913]. 1/-. 6 x 4.

Atlas of the World. [34 pp. and index.] The Cunard S.S. Co., New York, 1911. 7 x 6 inches.

Handels-Atlas zur Verkehrs- und Wirtschaftsgeographie. Für Handelshochschulen, kaufmännische, gewerbliche und landwirtschaftliche Lehranstalten, sowie für Kaufleute und Nationalökonomen. Herausgegeben von A. Scobel. 68 Haupt- und 73 Nebenkarten sowie 4 Diagramme auf 40 Kartenseiten. Velhagen & Klasing, Bielefeld & Leipzig, 1902. 5 Mk. 50 Pf. 13 x 10 inches.

Atlas antiquus, in forty-eight original, graphic maps, with elaborate text to each map and full index. By Emil Reich. Macmillan & Co., London, 1908. 10½ x 8 inches.

Cartes et croquis des campagnes de 1789 à nos jours, avec sommaires explicatifs. [By] R. Jalliffier & A. Buchner. 5e édition. Garnier Frères, Paris, [1913]. 10½ x 7½ inches.

Cohrs' Atlas över Sverige. Fullständig reskarta i fickformat utarbetad och graverad av Edvard Cohrs, med geografiska och statistika uppgifter, jänte fullständigt namnregister. Nionde upplagan. Aktiebolaget Ljus, Stockholm, 1913. 3 Kronor. 8 x 5 inches.

Historisk Skole-Atlas. [By] Gustav Rosendal. [6 double pages of maps.] Rasmus Handels Boghandel, Odense, [1913]. Kr. 75 Øre. 12 x 9 inches.

Schoolatlas van Nederlandsch Oost-Indië, door W. van Gelder, Oudinspecteur van met Inlandsch Onderwijs. Twaalfde, herziene druk, (met alphabetische lijst van alle namen). J. B. Wolters, Groningen, 1914. F. 1.90. 13 x10 inches.

Missions-Atlas der Brüdergemeine. Achtzehn Karten mit erläuterndem Text. Herausgegeben von der Missionsdirektion der evangelischen Brüder-Unität. [18 plates.] Missionsbuchhandlung, Herrnhut, 1907. Mk. 3.50.

Bacon's large scale atlas of London and suburbs (revised edition) with an alphabetical index of over 20,000 names. With additional road maps of the home counties and a series of 13 special maps showing the different areas controlled by Government departments, local authorities, and supply companies, having statutary powers in and around the city and county of London. Edited by William Stanford. [56 sheets, loose in bound folio.] G. W. Bacon & Co., Ltd., London. 14 x 21½ inches.

Graphisch-statistischer Atlas der Stadt Nürnberg. [24 maps and index.] Selbstverlag des Stadtmagistrats, Nürnberg, 1913. 11 x 7 inches.